
<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
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<tbody>
<tr>
<td>Gilberto Sostre, M.D.</td>
<td>Residency Program Director</td>
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<tr>
<td>Janet Munroe, M.D.</td>
<td>Associate Program Director</td>
</tr>
<tr>
<td>Frances M. M. Wolff</td>
<td>Residency Coordinator</td>
</tr>
<tr>
<td>James Rawson, M.D.</td>
<td>Chairman of Radiology</td>
</tr>
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![Image of the residency program team]
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Introduction

The Medical College of Georgia at Georgia Regents University is part of the University System of Georgia. The hospital and clinics and the Georgia Radiation Center make up this clinical enterprise which serve as support institutions for the teaching functions of the Georgia Regents University (GRU) working together to provide instruction, research, and patient care.

The Medical College of Georgia Hospital and Clinics (MCG) was restructured as Georgia Regents University. GRU, including the Children’s Hospital of Georgia (CHoG), is a 570 bed institution providing both primary and specialty care. The hospital also serves as the designated Level I Trauma Center for the East Central Georgia Health District.

It is the responsibility of the faculty, residents and staff of the Department of Radiology to provide high quality patient care and to demonstrate professionalism in their daily activities.

The purpose of this Resident Manual is to present the Policies and Procedures of the Radiology Department, the curriculum, goals and objectives of the residency program and to describe the various activities and expectations associated with being a resident in our department. The contents are current as of the time this manual is presented to you; however, the faculty of the department retain the right to change schedules, documents, and/or activities with approval of the Program Director, as long as changes do not affect the overall outcome of the residents’ program of study.

In addition to the policies included in this manual, residents need to familiarize themselves with Department and Hospital Policies and Procedures that apply to their practice of radiology and administration of patient care services. GRU policies and procedure are available on the website www.gru.edu

Mission, Goals and Objectives

The Mission of the residency program in diagnostic radiology at the GRU is the comprehensive education and preparation for service of radiology residents by offering a quality education experience of adequate scope and depth in all associated modalities.

The Goal of the program is that by the time of their graduation, all residents should be fully competent to practice as general radiologists utilizing all imaging modalities. All graduating residents will be fully qualified to complete their certification by the American Board of Radiology and will be expected to obtain full privilege credentialing in general diagnostic radiology.

The Objectives of the radiology residency program are:

1. To provide comprehensive education, training and experience in all areas of Diagnostic Imaging, including but not limited to, plain film radiography and fluoroscopy, computed tomography, ultrasound, magnetic resonance imaging, vascular and interventional procedures, mammography, nuclear radiology, physics, radiobiology and radiation protection.

2. To provide clinical and didactic experiences that will enable the resident to correlate information obtained through the application of various diagnostic modalities with appropriate pathologic differential diagnoses, leading to accurate patient diagnosis.

3. To provide didactic experiences that will enable the resident to become knowledgeable in the application of physical, technical, and biomedical principles of diagnostic procedures. Laboratory sessions will provide additional technical experience when appropriate.
4. To provide an intellectual environment that encourages residents to actively learn throughout their residency and to establish a pattern of lifetime continuous medical education following completion of the training program.

5. To stimulate interest in radiology research and create an environment conducive to the performance of research projects during the period of residency training. To promote in all residents the vision of the radiologist as a medical consultant and clinical/academic educator.

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<thead>
<tr>
<th>Policies and Procedures: Overview</th>
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<tr>
<td>Residents and faculty share the major responsibility for radiology patient care. The faculty will assign tasks to the resident during each clinical rotation according to the resident’s level of competence and experience. The resident completes assigned tasks under supervision of the faculty. The faculty assumes final responsibility for the quality of the resident’s work. The scope of activities and levels of supervision vary according to the types of activities performed within each subspecialty rotation of the radiology department.</td>
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<td>The Radiology faculty has the overall responsibility for the radiology care of our patients and the supervision of the residents sharing in their care. Residents are given progressively increased responsibility and independence throughout their training according to their level of education, ability and experience. Resident clinical competency is measured by constant faculty evaluation of the resident’s performance during the rotation as well as objective testing using the yearly In-Training examination, radiology mock boards and other testing methodologies.</td>
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| ALL studies performed and interpreted by Radiology residents are supervised and/or reviewed by faculty within the respective sections of the department. Radiology faculty provide on-call primary or backup coverage for all imaging disciplines 24-hours per day and, are always available for radiology resident consultation, personally or via teleradiology digital access. |

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<tr>
<th>Service Chiefs and Faculty</th>
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<td>Rotation</td>
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<td>Ultrasound</td>
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<td>Vascular/Cardiac CT</td>
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<td>Service Chief</td>
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<td>Subspecialty Chief:</td>
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<td>Faculty</td>
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<td>Gilberto Sostre</td>
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<td>Janet Munroe</td>
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<td>James Rawson</td>
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<tr>
<td>Paul Karmin</td>
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<td>William Bates</td>
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<tr>
<td>Kandace Klein</td>
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<td>T. Lane Estes</td>
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<tr>
<td>Karen Panzitta</td>
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<td>James Craft</td>
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<tr>
<td>Clarence Joe</td>
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<td>Julia Melenevsky</td>
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<td>Norman Thomson</td>
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<td>Clarence Joe</td>
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<td>Bennett Greenspan</td>
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<td>Jayanth Keshavamurthy</td>
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<td>Ramón E. Figueroa</td>
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5
Responsibilities and Objectives of Residency Rotations

In compliance with the ACGME minimum program requirements, the Radiology Residency Program at GRU requires its residents to obtain competencies in the 6 areas listed below to the level expected of a new practitioner with future competencies in the Milestone Program:

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

While these competencies have always been a part of residency training, their delineation as requirements has mandated specific competency-directed activities and careful documentation. Toward this end, the following knowledge, skill, and attitude requirements, as well as additional Radiology procedural technical ability, interpretive skills and institutional requirements have been defined.

**Prior to beginning Radiology Residency:** The first postgraduate year must be completed in an ACGME, AOA, RCPS approved program. Resident must be in good standing and from an accredited clinical training in internal medicine, pediatrics, surgery or surgery subspecialties, obstetrics & gynecology, neurology, family practice, emergency medicine, transitional year or any combination of these. No more than a total of three months may be spent radiology, radiation oncology, and/or pathology. Step 3 must be completed by PGY 2.

Responsibilities and Objectives for All Residents on All Rotations

1. All residents will maintain full-time position as radiology resident in the Section of Radiology. All residents will be responsible for the year-specific job description described hereafter.
   **Competency or Objective:** Institutional Requirement
   **Documentation:** Graduate Medical Education Office Resident Rolls

2. Upon receiving and reviewing this handbook, all residents should sign the last page, certifying receipt of the handbook, tear out the page, and turn it in to the Program Coordinator; Fran Wolff.
   **Competency or Objective:** Institutional Requirement
   **Documentation:** Receipt of signed certification page by Program Coordinator.

3. All residents will engage in the care of patients and facilitate timely performance and interpretation of patient studies on all rotations. Residents act as a team under the guidance of the attending radiologist to protocol, perform, interpret and communicate the findings of radiology examinations.
   **Competency or Objective:** Patient Care, Professionalism, Interpersonal and Communication skills
   **Documentation:** Faculty, Peer, Technologist Staff, Support Staff Evaluations.

4. All residents will develop a radiology interpretation and plan based on the radiology, clinical and pathologic information. Counsel patients concerning the preparation for diagnostic testing. Demonstrate skills in obtaining informed consent, including effective communication to patients about procedures, alternatives and possible complications. Perform radiology examinations appropriately and safely, assuring that the correct examination is ordered and performed.
Competency or Objective: Patient Care, Professionalism, Interpersonal and Communication skills, Medical Knowledge Base, Practice-Based Learning and Improvement, Systems-Based Practice.

Documentation: Faculty, Technology staff, Support Staff evaluations.

5. All residents will prepare for, attend and participate actively in all teaching conferences. (Categorical Course, Case Conferences, Visiting Professor Conferences, Resident Breakfast Meeting, Journal Club, Grand Rounds, M&M Conference, Physics Review Course, Book Review for first year residents), and any additional lectures and course instruction deemed mandatory by the faculty. Residents on medical leave, annual leave or called to assist in patient care matters that cannot be delegated to the attending or wait until the conclusion of conference will be excused. Minimum conference attendance of 80% is expected in order to maintain good standing with the program.

Competency or Objective: Medical Knowledge Base, Practice-Based Learning and Improvement, Interpersonal and Communication Skills.

Documentation: Record of Attendance, Faculty Evaluations, In-Service Examination Scores, Visiting Professor Evaluations, Physics and Diagnostic Written Board Examination Scores.

6. All residents will prepare for and take the annual In-Service examination (February) sponsored by the American College of Radiology

Competency or Objective: Medical Knowledge Base, Practice-Based Learning and Improvement.

Documentation: In Service Examination Scores. Minimum scores of 30th percentile are expected.

7. All first, second and third year residents will prepare for and take the Radiology Core Examination, sponsored by the American Board of Radiology in June of their 3rd year of residency.

Competency or Objective: American College of Radiology requirement, Medical Knowledge Base.

Documentation: core Examination score of passing is expected.

8. All residents will prepare for and must be in good standing with the program at the time of graduation in order to be eligible to sit for the Radiology Certifying examination given 15 months after graduation.

Competency or Objective: Medical Knowledge Base, Practice-Based Learning and Improvement, Interpersonal and Communication Skills.

Documentation: Exit evaluation by Program Director documents resident in good standing at time of graduation.

9. All residents will adhere to an 80 hour work week policy described in the Section of Radiology Policy and Procedures portion of the Handbook. If the time limit is reached, the resident should notify the program director/associate program director or chief resident and /or supervising faculty member, sign out his or her pager to the program coordinator and leave the facility.

Competency or Objective: ACGME/Institutional Regulations, Patient Care

Documentation: Time Logs, Time Log Audit Reports, Documentation from Program Coordinator.

10. All residents are responsible for monitoring their level of fatigue. If a resident feels as if their level of fatigue is compromising their ability to provide patient care, the resident should notify the program director /associate program director or chief resident and/or supervising faculty member,
sign out his/her pager to the program coordinator and go to the call room (or home if the resident is not to compromised to drive) and sleep. The resident may return to duty after a nap if he or she feels sufficiently rested and the shift is not completed or the 80 hour work week limits have not been reached. If a resident is judged to be too fatigued to adequately provide patient care by the chief resident and/or supervising faculty, even if the resident does not agree, the same protocol applies.

Competency or Objective: Patient Safety
Documentation: Faculty and Peer Evaluations. Documentation from the Program Coordinator

11. All residents will read and prepare assignments given by faculty and are expected to read other topics in conjunction with care of patients with those topics as part of their personal home study routine. At case conferences, categorical course conferences, and at the work stations, all residents will be asked questions at random and any incorrect or unclear answers will warrant review by supervising faculty assigned by area of expertise.

Competency or Objective: Medical Knowledge, Interpersonal and Communication Skills, Practice-Based Learning
Documentation: Faculty Evaluations and Attendance Records

12. All residents will read assigned articles in Journal of Radiology or other articles in journals assigned by the faculty and will be required to participate in Journal Club article review to summarize the article, discuss the methodology of the study and appropriateness of the statistical analysis and alternative study designs that might better answer the hypothesis presented by the authors. Any incorrect or unclear answers will be reviewed by supervising faculty assigned by area of expertise.

Competency or Objective: Medical Knowledge, Interpersonal and Communication Skills, Practice-Based Learning
Documentation: Faculty Evaluations

13. All residents should demonstrate understanding of socioeconomic issues impacting upon the practice of radiology including but not limited to the awareness lack or limits of individual patient Medicare, Medicaid, Peach Care, HMO, PPO, or other insurance coverage; frugal use of expensive tests.

Competency or Objective: Systems-Based Practice, Professionalism
Documentation: Attendance (in person or on-line) and adequate scores on post-test GME Core Competency Lectures related to Socioeconomic Issues, Attendance at radiology section didactic lectures by practice CEO/coding office/hospital legal counsel, Faculty Evaluations.

14. All residents are expected to demonstrate sensitivity to patient diversity issues including but not limited to race, gender, cultural/religious beliefs, sexual orientation, career choice, socioeconomic status and educational/intelligence level.

Competency or Objective: Professionalism
Documentation: Attendance (in person or on-line) and adequate score on post-test GME Core Competency Lectures related to Ethics, Attendance at radiology section didactic lectures by hospital legal counsel, Evaluations by Faculty, Technologists, Peers, Patients and Administrative staff.

15. All residents are expected to develop and demonstrate values consistent with the highest ethical practice of medicine.

Competency or Objective: Professionalism
Documentation: Attendance (in person or on-line) and adequate score on post-test for GME Core Competency Lectures related to Ethics, Attendance at radiology section didactic lectures by
hospital legal counsel, Evaluations by Faculty, Technologists, Peers, Patients and Administrative staff.

16. During rotations at the work stations and during procedures all residents are expected to take part in the teaching of students, interns and more junior radiology residents including but not limited to discussions of normal anatomy, physiology, and embryogenesis on multiple radiologic modalities, elements of radiologic physics and radiation safety, procedural techniques, radiologic evaluation and interpretation and appropriateness criteria for ordering and choosing radiologic examinations.
Competency or Objective: Medical Knowledge, Interpersonal and Communication Skills, Professionalism
Documentation: Student and Peer Evaluations

17. All Residents will have a 4-week research rotation during their R2 year of training. A research project and a faculty mentor must be chosen at least three months prior to the assigned research rotation and submitted to the Residency Coordinator. Prior to starting the research rotation the resident must write up an abstract and/or detailed written plan of the project design and how the individual weeks of the research rotation will be used and submit this to the Program Director and give a 5 minute presentation at grand rounds in August of their R2 year. Residents who do not meet the required deadlines stated above may be reassigned to a different Radiology rotation at the discretion of the Program Director. Residents are encouraged to identify a project or case study that will lead to an exhibit, a presentation at a Regional or National meeting and publication of their research efforts as a peer-reviewed journal article. Resident research projects may also be presented at the department’s Research and Education conferences. Residents are also encouraged to pursue additional research projects during their training as time and experience permits. These research projects will be put into the residents learning portfolio.
Competency or Objective: RRC requirement, Medical Knowledge, systems-Based Practice, Practice-Based Learning and Improvement.
Documentation: Submission of research project, Research Faculty Evaluation. Residents Learning Portfolio.

18. All residents are required to maintain ACGME Case log and cumulative case logs (using CPT coding) to be submitted on a regular basis (as requested) to the Program Coordinator. Procedure Log (Special Procedures such as biopsies, nuclear medicine therapies, interventional procedures, etc.) and Case Log (all studies interpreted in all rotations, including night float and short call, even if not dictated).
Competency or Objective: ACGME requirements, Medical Knowledge, Technical Skills, Patient Care
Documentation: Procedure logs kept with Program Coordinator and ACGME online case log.

19. All residents are required to complete 16 weeks of Nuclear Medicine training. During these rotations the resident is required to maintain a complete record of all procedures/studies. Strict documentation of I-131 sodium iodide treatment and therapy (>33 millicuries and < 33 millicuries) must be maintained. The resident is required to complete training in Radiation Physics and Instrumentation, Radiation Protection, Mathematics pertaining to the use and measurements of radioactivity, Radiation Biology, and Radiopharmaceutical chemistry.
Competency or Objective: American Board of Radiology in compliance with the Nuclear Regulatory Commission requirements, Medical Knowledge, Interpersonal and Communication Skills, Professionalism.
20. All residents are required to complete 12 weeks of Mammography training. The resident must keep strict documentation of all studies/procedures completed and must complete a minimum of 240 mammogram evaluation and interpretations within in a six month period to graduation. The resident must have a minimum of 60 hours of documented breast imaging educational training. Competency or Objective: Residency Review Committee and American Board of Radiology requirements, Medical Knowledge, Interpersonal and Communication Skills, Professionalism. Documentation: Procedural Lists kept with the Program Coordinator and ACGME online case log.

21. All residents are required to prepare for and begin solo call duties in the beginning of their R2 year of residency after successful completion of a complex imaging examination by faculty and after faculty review committee has approved the resident for call. This is performed as the Short Call or Week-end Day or Week-end night call or Night Float rotation and the resident will assume all responsibilities as the on-call radiology resident.

- **Short Call:** 5:00pm until 9:00pm on week nights (Monday through Friday)
- **Weekend Day Call:** Saturday &/or Sunday 8:00am until 9:00pm
- **Weekend Night Call:** Saturday &/or Sunday 8:00pm until 8:00am
- **Night Float:** Sunday – Thursday 8:00pm until 8:00am
  - Friday – Sunday 8:00pm until 8:00am

Competency or Objective: American Board of Radiology requirements, Medical Knowledge, Interpersonal and Communication Skills, Professionalism, Systems-Based Practice. Documentation: Faculty Evaluations and Resident QA forms kept with the Program Coordinator, Preliminary Reports.

22. All residents will attend 4-week AIRP (American Institute of Radiologic Pathology) Radiology Pathology course. The resident is required to submit one case for acceptance to the AIRP course. Guidelines for case requirements can be reviewed online. This course meets ACGME program requirements for training in radiology pathology. Under normal circumstances the tuition and related costs are funded institutionally.

Competency or Objective: ACGME and American Board of Radiology requirements. Medical Knowledge, Professionalism.

Documentation: AIRP Attendance Record submitted to the Program Coordinator. Minimum of 80% attendance required. Absences must be approved and reported to the Program Director.

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<th>GME Categorical Conferences</th>
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<td><strong>IRCC</strong></td>
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<tr>
<td>Time: Every Wednesday at noon (lunch provided) and, within 48hours, each presentation is available on-line.</td>
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<tr>
<td>Location: Small Auditorium</td>
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<td>These weekly conferences that run fall through spring are designed to address the ACGME mandated competencies of Patient Care, Medical Knowledge, Practice-Based Learning, Interpersonal Communication Skills, Professionalism, and Systems-Based Practice. Residents are required to complete 60% of lectures per ACGME.</td>
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Since the noon conference on Wednesdays conflicts with the radiology didactic schedule, radiology residents may view the on-line archive of this conference. To access lectures on-line:

1. Go to http://www.curriculumii.mcg.edu/webct/public/home.pl
2. Select “log on to MyWebCT”
3. Log in by entering your WebCT ID and password (note: do not use special characters {hyphens, apostrophes, etc} and type all letters lowercase).
   Your user name is the first initial of your first name, full last name, and four-digit number made from your birthday (month/day). Example: Christopher Columbus, Oct. 12, 1983 would be: “ccolumbus1012”
   Your password is the last four digits of your Social Security Number.
4. Click on Interdisciplinary Residency Core Curriculum Series
5. Select the presentation to view (the presentation must be “viewed” to its completion before you will receive credit). When complete, select the test for the presentation you viewed (you will not be given credit for the test if you did not view the presentation in its entirety, regardless of the score you get on the test).

If you have any questions please call Mary Stephens, GME Office at 721-3052.

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<thead>
<tr>
<th>Categorical Courses</th>
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<td>Image rich daily didactic lectures given by subspecialty faculty to the residents.</td>
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<tr>
<td>July: INTRODUCTION TO RADIOLOGY</td>
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<td>August: CHEST</td>
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<td>September: MSK</td>
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<td>October: GU</td>
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<td>November: GI</td>
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<td>December: MAMMOGRAPHY</td>
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<td>January: NEURO</td>
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<td>February: PEDIATRICS</td>
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<td>June: TRAUMA/RADIOBIOLOGY</td>
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<tr>
<th>Case Conferences</th>
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<tbody>
<tr>
<td>Case conferences are given by faculty or residents which present “hot seat” style cases. The 10 subspecialities are assigned a minimum of one session per month. Chief Resident case conferences are prepared and given by residents monthly.</td>
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</tbody>
</table>

Case Conference Schedule:
1st Thursday of the month is Pediatrics
1st Tuesday of the month is MSK
1st Wednesday of the month is GI
2nd Thursday of the month is Neuroradiology
2nd Tuesday of the month is Chief Resident Conference
2nd Wednesday of the month is US
3rd Thursday of the month is Resident breakfast meeting
3rd Tuesday of the month is NM
3rd Wednesday of the month – no case conference (staff meeting and the classroom is being used)
4th Thursday of the month is Chest
4th Tuesday of the month is Mammography
4th Wednesday of the month is VIR

The 5th of any month is TBA

<table>
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<tr>
<th>Resident Dress Code</th>
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Professional attire is expected of all Radiology Department residents, fellows and faculty. ID badges are required at all times.

Required dress code guidelines are as follows:

1. Male residents: Conservative business or professional-quality long or short sleeve shirts with a collar, non-denim dress pants. Tie is suggested but optional. Professional or business-quality footwear is required.

2. Female residents: Conservative business or professional-quality dress pants OR a skirt and collared long or short-sleeve dress shirt OR a business-style dress, OR other professional-quality apparel. Professional or business-quality footwear is required.

Male and female jewelry should be conservatively styled. The Department of Radiology reserves the right to determine the acceptability of dress and general appearance as necessary, through normal supervisory channels.

White coats worn over your clothes or scrubs are recommended in areas of direct patient contact or visibility and at interdepartmental conferences.

All residents and staff will adhere to the GRU. Surgical Attire Policy. Hospital scrubs are required on interventional rotations and when leaving the interventional suite a white coat or scrub jacket must be worn. GRU scrubs may not be worn home from the hospital or worn into the hospital. While on adult fluoroscopy, pediatric fluoroscopy rotations, and on-call, residents may wear personal scrubs with white lab coats. Personal scrubs are not allowed on other rotations.

Residents or faculty who are not appropriately dressed will be counseled in proper dress for the hospital workplace at the first occurrence. At the second occurrence they will be sent home to obtain proper dress, with the time charged to vacation leave. A third occurrence will require more intensive investigation and action.

<table>
<thead>
<tr>
<th>Telephone Protocol</th>
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Local calls can be made from most phones in the Radiology Department. Phone calls from all extensions in the department are reported to the Business Manager on a monthly basis. Long distance personal calls should not be made on hospital phones without authorization by Radiology Business Manager.

<table>
<thead>
<tr>
<th>Normal Work Day</th>
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</table>
The working day for radiology residents begins at 7:30. Monday and Friday physics from 7:30 to 8:30, case conference Tuesday, Wednesday, and Thursday from 7:30 to 8:30; categorical course daily from 12:00 (noon) to 1:00 pm. In most areas the workday ends when the resident’s responsibilities have been completed. This may be before or after 5 PM, depending upon the rotation, patient load and staff efficiency, however the area must continue to have coverage by either the attending or resident until a minimum of 5pm. Call coverage starts at 5 PM (See Call Responsibilities section below).

### Basic Life Support Training

Basic Life Support (BLS) Training is an institutional and departmental requirement for all residents. Training sessions are provided at GRU and VAMC periodically throughout the year. Residents are individually responsible for scheduling and attending these training sessions to insure their certification. Advanced Cardiac Life Support Training (ACLS) is not required, but is recommended for all residents.

### R Level-Specific Overall Roles, Responsibilities and Functions

The roles, responsibilities and functions of the diagnostic radiology resident per training year are based on the following objectives, as follows:

I. R1
   1. Review Rotation Goals and Objectives prior to beginning rotation. Clarify any questions regarding duties with expected attending at start of rotation.
   2. Get exposed to the broad spectrum of patient examinations and/or procedures as assigned by attending or senior resident with an emphasis on quality of patient evaluation and patient care.
   3. In-depth discussion of all cases with the attending prior to initiation of all but the most basic diagnostic studies or therapeutic interventions.
   4. Take no supervisory role or direction of decisions of other residents or medical students, but ensure active medical student involvement.
   5. All procedures must be done under direct approval and supervision of attending radiologist.
   6. Take supervised Freshman call beginning in August as an observer and learner
   7. Prepare for and pass Freshman plain film examination in order to begin supervised plain film call beginning in January.
   8. Prepare for and pass Freshman complex imaging examination in order to begin solo call July of their R2 year.
   9. By completion of the first 12 months of residency and the minimum required training in core rotations, residents should be judged by the faculty to be capable of serving as the Short Call Resident, providing immediate plain film consultation to Emergency Room and Hospital physicians. It is recommended that R1 residents do not take vacation on core Rotations.
   10. By completion of the first 12 months of residency and the minimum required training in core rotations, residents should be judged by the faculty to be capable of serving as the Night Call Resident, providing immediate plain film, CT, MRI, ultrasound and nuclear radiology consultation to Emergency Room and hospital physicians.
   11. All residents are required to take the Resident In-Training examination each February. Residents are expected to pass this examination with a global score of 30th percentile or more. A performance below 30th percentile will require performance review by program director. Percentile scores will be included in the yearly performance criteria required for promotion to the next year of radiology residency training.
II. R2
1. Review rotation goals and objectives prior to beginning the rotation and clarify any questions regarding duties and expectations at start of rotation.
2. Residents are required to take RAPHEX Examination given by RAMES and physics department.
3. Take responsibility to be familiar with patients, diagnostic radiology examinations and procedures and serve as the attending physician’s principal resource for day-to-day patient data.
4. Primarily responsible for teaching medical students.
5. Emphasis on gaining experience with full spectrum of diagnostic and invasive radiology procedures and increasing proficiency on skills already acquired.
6. All decisions regarding invasive radiology procedures and specialized diagnostic procedures are discussed in depth with the attending.
7. All procedures must be done with complete attending supervision and approval.
8. By completion of the second year of training, residents should show increased ability in interpretation of plain films, computed tomography, ultrasound, magnetic resonance imaging and nuclear radiology studies.
9. Most residents are expected to have completed adequate study to pass the physics portion of the written examination of the American Board of Radiology in the fall of the PGY 3 year.
10. All radiology residents are required to take the Resident In-Training examination each February. Residents are expected to pass this examination with a global score of 30% or more. A performance below 30% will require performance review by program director. Percentile scores will be included in the yearly performance criteria required for promotion to the next year of radiology residency training.

III. R3
1. Review rotation goals and objectives prior to beginning the rotation and clarify any questions regarding duties and expectations at start of rotation.
2. Increased proficiency with full range of invasive and diagnostic procedures.
3. Must discuss all cases with attending prior to performance of vascular/interventional procedures and complex diagnostic studies.
4. Research rotation and Vascular Ultrasound rotation to occur this year.
5. AIRP rotation is generally scheduled within the R3 year.
6. By completion of the third year of training, residents should demonstrate advanced skills in interpretation of routine and complicated imaging studies in all areas of radiology.
7. Residents will be expected to qualify and pass the ABR Core examination spring of third year.
8. All residents are required to take the Resident In-Training examination each February. Residents are expected to pass this examination with a global score of 30% or more. A performance below 30% will require performance review by program director. Percentile scores will be included in the yearly performance criteria required for promotion to the next year of radiology residency training.

IV. R4
1. Review rotation goals and objectives prior to beginning the rotation and clarify any questions regarding duties and expectations at start of rotation.
2. Senior residents play a supervisory role of junior residents, with increased teaching responsibilities
3. Senior residents play increased role in consultation with other residents or attending physicians from other clinical services.
4. Senior residents are expected to have passed the ABR Core examination.
5. All radiology residents are required to take the Resident In-Training examination each February. Residents are expected to pass this examination with a global score of 30th
percentile or more. A performance below 30th percentile will require performance review by program director. Percentile scores will be included in the yearly performance criteria required for promotion to the next year of radiology residency training.

6. Senior residents should be in good standing in order to be eligible for ABR certifying examination 15 months post-graduation.

7. Senior residents will have electives as “mini” fellowships as the program is able to accommodate.

VI. R5 (FELLOWS)

1. Review rotation goals and objectives prior to beginning the rotation and clarify any questions regarding duties and expectations at start of rotation.

2. Trainee must fulfill complete requirements for credentialing for year of training with consultation with fellowship program director.

3. Trainee must carry out procedures with attending input and supervision as required before, during and after procedure.

4. Trainee will play a major role in instruction and supervision of radiology residents as well as medical students.

5. Trainee will interact with residents and attending physicians on other services on a co-equal footing in relation to procedures and diagnostic test results as part of integrated patient care team.

6. Trainee must demonstrate competence to function independently without significant faculty supervision as a general diagnostic radiologist for coverage of services outside of their subspecialty field of study, according to radiology department needs.

7. Trainee is expected to maintain good standing in the program and maintain eligibility for ABR certifying examination if applicable.

8. Trainee will be expected to be qualified to pass the corresponding examination for their field of subspecialty training conducive to Certificate of Added Qualifications of the American Boards of Radiology by the completion of their training or other relevant certification.

9. Expected to apply for MOC.

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**Call Responsibilities: General Considerations**

Radiology Call is a combination of a Night Float rotation and short individual calls overlapping with the Night Float. The resident on-call will be in-house during the entire time of call. We provide a secure Call Room within the Radiology Department, with private sleeping and shower facilities, phone and networked computer.

**Short call** is from 5:00 pm to 9:00 pm on weekdays (Mon-Fri). The resident on short call starts his day at the 7:30 am conference and stays in the hospital until 9 pm, overlapping one hour with the Night Float resident to take care of case backlogs and allow a smooth transition to the Night Float. The following day, he/she begins the workday at 10 AM beginning with check out of all cases from short call evening before.

The **weekend call** is subdivided into 8 AM to 9:00 PM Saturday, and 8:00 PM Saturday to 8:00 AM Sunday, 8:00 AM to 9:00 PM Sunday and 8:00 PM Sunday to 8:00 AM Monday. This format of call also applies to holidays outside of weekends.

**Night Float** runs from 8 pm until 8 am from Sunday through Thursday. The night float schedule is established for the entire year according to the yearly rotation schedule. The chief resident prepares the call schedule distributing short calls among residents not on the night float rotation for the specific time period to be covered (See Appendix B). A faculty member staffs the resident on ER studies. Radiology faculty call is provided 24 hours a day by attending radiologists for each section, and consultation on digital imaging examinations is provided in person or by teleradiology.
The resident on-call will be in the department during the on-call hours and readily available through Radiology Call Beeper (721-7243, x7396) to referring physicians, technologists, or file room personnel. The resident is expected to be physically in the department, or the Radiology Department at the VAMC.

### Call Schedule

The night float, short call, weekend and holiday call schedule is prepared by the chief Resident and approved by the Program Director. The schedule is created in conjunction with the rotation scheduled prepared by the Program Director. The rotation/call schedule is distributed in June for the entire academic year. It is also available on Google Docs. Each week, the names of the residents, technologists, and faculty on-call. Call schedules are posted on google docs. Call schedule is also posted on the “on call scheduler” on the web [http://hi.georgiahealth.edu/oncall/](http://hi.georgiahealth.edu/oncall/). Once the weekly call schedule has been made and distributed, changes can be made only in the case of emergencies. Any changes in the call schedule must be approved by the Program Director and chief resident, and given to the Resident Coordinator prior to 3:00 pm. This will insure that the correct name is posted.

All residents will begin freshman supervised call with upper level residents beginning August of freshman year. This is an observational exposure only with no interpretation or dictation duties allowed. In general, this will occur one day per week from 5:00 pm until 9:00 pm. Freshmen resident ill gradually increase their number and length of Freshman Supervised Call as they progress through their R1 year. Beginning in January of their R1 year, they will be tested and if approved begin supervised PLAIN FILM call which requires that all film interpretation by the R1 must be revised and approved by an upper level resident or attending prior to any communication by the R1 with the ordering service. The communication of findings will also be monitored by the upper level or attending radiologist.

### Competency or Objective: Residency Review Committee and American Board of Radiology requirements, Medical Knowledge, Interpersonal and Communication Skills, Professionalism

### Documentation: Peer Evaluations, Faculty Evaluations, Technologists Evaluations.

The on-call resident is on-call for both GRU and the VAMC. It is the responsibility of the original resident taking call to notify all appropriate personnel of any changes in the call schedule. Any resident who does not cover his/her scheduled call will be assigned double the call duty missed by the Chief Resident, unless there are extenuating circumstances. The resident(s) who has to cover for the absentee resident will choose two equivalent days to be covered by the absentee resident.

### Pagers

Pagers are permanently assigned to all radiology house officers upon entry into the residency program and a list of pager numbers is posted along with the call schedules. The resident must inform the Residency Coordinator in a timely fashion if there is to be a change in the pager number and the resident must then inform the hospital operator, front desk and technologist-on-call of a change in pager number, and indicate this change on the pager list. In event of pager loss or damage due to negligence, the resident will be held financially responsible for replacement of the pager. A separate pager is used specifically for Radiology Call (721-7243, x 7396), which is handed over among residents when call responsibilities are turned over. Alternatively the call resident can forward the call pager to his own personal pager. This is the ONLY PAGER used for all radiology resident call functions.

All residents must return pages in a timely fashion (15 minutes) If the resident is in a procedure they are to have the technologist return the page for them.

### Specific Call Duties
The duties of the on-call resident are as follows:

1. Consult with the referring physicians, house staff from other services, students and others as requested.
2. Contact the appropriate sonographers and technologists as needed for studies requested.
3. Discuss protocol and interpret all ER studies. A preliminary report is to be dictated and called to the ER physician for all studies.
4. Discuss protocol and interpret all In Patient studies. A preliminary report is to be dictated on all In Patient studies. Emergent or urgent findings are to be called to the requesting service.
5. Resident will call and give OR “wet reads” to ordering service and will dictate the report using the “wet read” structured report.
6. Resident is responsible to read all emergent XR priority studies in the work list and call appropriate ordering service with findings.
7. Resident is to consult with ordering services on all emergent VIR requested studies. The resident is to call the VIR attending on call with all the pertinent information to allow VIR attending to decide on how to approach the case.
8. It is the responsibility of the resident to dictate a report on all emergent CT, MRI, Ultrasound, Nuclear Medicine and Plain films performed during their call. R2 residents may dictate bullet style with progression to full reports by R3. All dictations will include then name of the physician, NP or PA results were discussed with including the date and time.
9. ALL studies performed by the resident on call will be reviewed and verified by the assigned faculty. One-on-One read outs will be performed as necessary related to the resident skill level and any need for improvements will be discussed with the resident.
10. All emergent pediatric fluoroscopic examinations requested will be discussed by the radiology resident with the on call Pediatric attending prior to the resident contacting the necessary technologists.
11. All emergent adult fluoroscopic examinations requested will be discussed by the radiology resident with the on call Adult Body Imaging attending prior to the resident performing the study.
12. If the resident does not feel competent to perform an on call procedure they must contact the appropriate on call attending to discuss the case.
13. All outside examinations (OSH) on CD will be reviewed by the resident and the resident will give his/her opinion to the ordering service. The preliminary report will be written on the appropriate call preliminary carbon form. The CD, consult form and yellow copy of the preliminary report are sent to the file room to be loaded. The white copy is placed in the appropriate trays by the call station and the resident is to take the preliminary reports to the appropriate attending at the end of call.
14. All emergent Will’s Memorial studies will be interpreted as requested by the Will’s Memorial staff. A preliminary report will be written on the call preliminary carbon form. The forms will be taken to the appropriate attending at the end of call by the resident.

Weekend/Holiday Call
The residents will cover weekends and holidays in the same fashion.

Faculty on call for the subspecialty department sections review all studies performed within their section on a daily basis including weekends and holidays. Residents are expected to discuss and review all cases with the on-call faculty prior to leaving the hospital at the conclusion of call.

<table>
<thead>
<tr>
<th>Holiday Coverage Schedule</th>
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<tbody>
<tr>
<td>Official GRU Holidays:</td>
</tr>
<tr>
<td>- New Year’s Day</td>
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<tr>
<td>- Martin Luther King Birthday</td>
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<tr>
<td>- Memorial Day</td>
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<tr>
<td>- Fourth of July</td>
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<tr>
<td>- Labor Day</td>
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<tr>
<td>- Columbus Day</td>
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<tr>
<td>- Veteran’s Day</td>
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<td>- Thanksgiving Day</td>
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<tr>
<td>- Day after Thanksgiving</td>
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<tr>
<td>- Christmas Eve</td>
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<td>- Christmas Day</td>
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Official holidays are covered in the same manner as weekend days. Residents on VA rotations will participate in VA holidays, those residents rotating at GRU will participate in GRU holidays.

| Rotation Curriculum Requirements |

Resident rotations are typically 4 weeks in length. As much as possible, all residents will receive similar number of rotations in the different areas of radiology although there may be some variability. All residents will be assigned the required number of rotations in Nuclear Medicine and Mammography. It is highly recommended by this program that the residents do not schedule vacation during these two rotations, however if a resident must schedule leave the resident will make an internal change of rotation with another resident, making sure the total number of rotations for both residents remains the same as required. Changes must first be approved by the Program Director, who will notify the Residency Coordinator to log the change into the (revised) schedule. If at the end of the training program the number of rotation graduation requirements is not completed, the resident may have to make up any missing rotations beyond graduation time, delaying receipt of the certificate of residency.

| Brief Overview of Radiology Resident Rotations |

Residents will rotate through the following areas: Chest, Body Imaging (MRI, GI and GU), Ultrasound (including Neurosonology and OB-Ultrasound), Musculoskeletal Radiology, Pediatric Radiology, Neuroradiology, Nuclear Medicine and PET/CT Imaging, Cardiac Imaging, Plain Film Radiography (including Emergency Radiology), Vascular and Interventional Radiology, and Mammography. The Veterans Administration Medical Center and provides additional experience in Chest Radiology, Body Imaging, and Musculoskeletal Radiology.
Residents on Chest at GRU primarily interpret plain film radiographs of outpatients, inpatients, and Emergency Room patients. During the Chest rotation at the Augusta Veterans Administration Medical Center (VAMC), residents participate in the interpretation of all plain films, with additional fluoroscopy experience emulating the functions of a general hospital radiology department. Members of the VAMC General Diagnostic faculty provide supervision and teaching on a rotating basis in both areas.

Residents assigned to GRU Body Imaging will learn the procedures and interpretation of GI fluoroscopy, GU examinations, Body CT and Body MRI. Residents in the VAMC Body Imaging rotation will emphasize Body CT, MRI, and U/S. Residents on Body Imaging also assist with patient monitoring and assist with development and performance of CT and MRI protocols in addition to interpretation of cases.

Residents assigned to Ultrasound at GRU will learn to perform and interpret ultrasound studies including Doppler examinations. Under direct supervision and teaching by attending radiologist and sonographers. Residents are assigned to an Obstetrical and Gynecological Ultrasound rotation during the senior year (PGY-5). OB/GYN Ultrasound rotations are done in the ultrasound suite of the OB/GYN clinic under direction of the OB/GYN Faculty and Staff. Residents are assigned to a two-week neurosonology ultrasound rotation as part of their second US block. This experience is done at the Neurovascular lab under the supervision of Dr. Fenwick Nichols, a Neurology/Radiology joint faculty member.

Residents assigned to Musculoskeletal Radiology learn to interpret musculoskeletal plain films, CT and MRI. Residents will also participate in musculoskeletal procedures such as biopsies fluoroscopy and ultrasound assisted arthrography and injections.

Residents on Pediatric Radiology learn to interpret all radiological studies performed on pediatric patients (Plain Films, Fluoroscopy, U/S, CT, MRI) in the radiology suite of the CMC, the Pediatric Intensive Care unit, and the Neonatal Intensive Care unit. Residents also learn to perform all relevant fluoroscopy procedures.

Residents rotating on Neuroradiology learn to interpret all radiology of the head, neck and spine including plain films, CT and MRI. In addition the resident will learn CT and MRI protocols and techniques. As the resident progresses through higher level rotations, performance and interpretation of myelography and angiography procedures as well as exposure to neurointerventional radiology will be emphasized.

Residents on Nuclear Medicine will participate and learn all aspects of this field including establishment of basic knowledge of radiopharmacy, nuclear physics, radiation safety, quality control, and regulatory agencies as well as routine protocols and interpretation of images, including SPECT and PET images.

The Cardiac Rotation is an advanced rotation which fuses Nuclear Cardiology, Cardiac MRI and Cardiac CT.

Residents on Vascular and Interventional Radiology (VIR) participate in the performance and interpretation of all procedures and studies performed by the VIR service at GRU.

Residents on Mammography learn to interpret mammograms and assist in the performance of biopsy procedures including stereotactic biopsy and ultrasound guided biopsy, and breast MRI.
Residents on the Night Float rotation learn to interpret all imaging modalities used for Emergency Radiology. The night float rotation uses facilities at both GRU and VAMC, further discussed in the section on “Call Responsibilities” above.

Residents on Radiologic Pathology are assigned to the American Institute of Radiologic Pathology in Washington, DC for the four-week course. The Department of Radiology will fund the course tuition, and will provide a stipend to offset resident expenses under normal circumstances.

Radiology Research Rotation: Residents will have a four-week research rotation during their R2 of training. A research project and a faculty mentor must be chosen at least three months prior to the assigned research rotation and submitted to the Residency Coordinator. One month prior to starting the research rotation the resident MUST submit to Dr. Gilberto Sostre (Program Director) an abstract and/or detailed written plan of the project design and how the individual weeks of the research rotation will be used. The proposal MUST be approved by the research committees prior to the beginning of the rotation Residents who do not meet the required deadlines stated above will be reassigned to a different Radiology rotation at the discretion of the Program Director. Residents are encouraged to identify a project or case study that will lead to an exhibit, a presentation at a local Regional or National meeting and publication of their research efforts as a peer-reviewed journal article. Resident research projects may also be presented at the department’s Research and Education conferences. Residents are also encouraged to pursue additional research projects during their training as time and experience permits. During the research period the residents are assigned to a regular clinical rotation in the morning, are required to attend the noon conference and then will do their research time in the afternoon. In order to complete the ACGME requirement for this research project, the resident will publish or present a talk on their project.

Floater rotations simulate a daily private practice with a wide variety of assignments and modalities. This requires residents to contact the Program Director, Associate Program director or Program Coordinator at 7:30 am daily to be assigned rotation.

### Radiology Resident Performance Evaluation

The Diagnostic Radiology Faculty, constituting the Resident Evaluation Committee, meets semi-annually to review resident performance, with the spring meeting acting as the promotion meeting for residency progression.

At the mid-point of the rotation, faculty will sit with the resident for a one-on-one verbal performance evaluation. This allows residents to understand how they are performing and allows for improvement if needed during the second half of the rotation. At the end of each rotation, faculty will evaluate the residents using internet program evaluation form giving a summative evaluation of the competencies. The faculty evaluator will review the evaluation form with the resident.

Residents also evaluate faculty at the completion of each specialty rotation, and render a confidential program evaluation every six months of training.

Each resident’s progress is reviewed at six month intervals with the program director and/or Associate Program Director. Access to written evaluation forms is available through the internet program evaluations.

Mock board is given in the spring to R2 and R3 residents to evaluate progression and competency as radiologist. A practical oral plain film interpretation examination and complex imaging covering areas of Emergency Radiology is given to R1 residents December and May respectively.

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All radiology residents participate in the annual in-training Examination administered by the American College of Radiology. This examination is given during the month of February. Results generally are available in mid-April and the official spring evaluation takes place after that time. R2 residents participate in Raphex physics examination as administered by RAMPS. Examination is given in summer.

All R3 year residents are expected to participate and pass the ABR Core Examination given in late spring.

### Visiting Professor Program

An active visiting professor program is planned for each academic year, with approximately 5-8 visiting professors scheduled per year. Didactic Lectures and Case Conferences are given to the Radiology Residents by Visiting Professors. Visiting professor program is planned based on needs of residency program supplementation.

- Dr. Gomez (Radiology Specialists of FL, Orlando, FL) - Musculoskeletal
- Dr Alfred Watson (Baylor University, Houston, TX) – Mammography
- Dr. Joseph Sullivan (UAB Birmingham, AL) – Neuroradiology
- Dr. Paul Chandler (Macon, GA)– Pediatric Radiology
- Dr. Edgar Colon (UPR) – MRI/MSK MRI
- Dr. David Feigin (Johns Hopkins Medical Center)– Chest
- Dr. Arthur Fleischer (Vanderbilt University, Nashville, TN) - OB/GYN Ultrasound
- Dr. Brent Little (Emory University) – Chest
- Dr. Gundry (Emory University) -
- Dr. Newell (Emory University) -
- Dr. Givens (DDEAMC) VIR
- Dr. Mark Mullins (Emory University)
- Dr. Michael Kelly (DDEAMC) – General Radiology – Multidisciplinary
- Dr. Marchaud (DDEAMC) – Nuclear medicine

### Monthly Resident Breakfast Meetings

The residents hold a monthly meeting with the Residency Program Director, Associate Program Director, and Program Coordinator in the 2nd Floor Radiology Library on the third Thursday of each month, except when holidays interfere with the scheduled date. The Program Coordinator will distribute the agenda and a reminder about the meeting dates. The meeting begins at 7:30 AM.

<table>
<thead>
<tr>
<th>2013</th>
<th>2014</th>
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<tbody>
<tr>
<td>July 17</td>
<td>January 15</td>
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<tr>
<td>August 21</td>
<td>February 19</td>
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<td>September 18</td>
<td>March 19</td>
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<td>October 16</td>
<td>April 16</td>
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<tr>
<td>November 20</td>
<td>May 21</td>
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<tr>
<td>December 18</td>
<td>June 18</td>
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### Graduation

Attendance is mandatory for all residents for the Radiology Graduation Ceremony held in late June.
### Resident Monthly Meeting

Named “Innominate” meeting: The first Friday of the month from noon-1:00 pm is set aside for residents to meet and discuss issues related to the program to be raised to the program director’s attention. Chief resident will raise issues with program director at post faculty meeting or before. Issues, solutions, etc., to be discussed at Resident Breakfast Meeting (breakfast is provided).

### Education Funds

An education budget is established for each resident, to be used for the American Institute for Radiologic Pathology (AIRP) course. This budget includes tuition and an allowance for living expenses. The AFIP course is generally scheduled during the early R3 year of residency.

### Department-Financed Travel

The department will finance a trip to major national radiology meetings (such as RSNA, ASNR, AUR or ARRS) for each resident that is the first author and/or accepted presenter of a research paper. Resident must get pre-approval well in advance from faculty sponsor mentoring the research project, Program Director and chairman to insure that all documentation requirements are met. If you are making a scientific presentation at an additional meeting, check with the Program Director and/or Chairman in advance, since unexpended funds may be available to support more than one presentation per resident.

All proposed travel must be approved by the Program Director prior to registration.

### Main Departmental Library

A substantial amount of money and effort has been expended to establish a well-balanced and current department library. In order to maintain a functioning library, the following rules were established.

1. The library is specifically intended for use by all faculty and residents of the Department of Radiology of the GRU, including those faculty members working at the Veterans Administration Medical Center, and the Georgia Radiation Therapy Center.
2. Medical students, interns and clinical residents taking Radiology rotations are allowed to use the library during normal working hours, but will not be allowed to check out books.
3. Reference books are to be used within the library only and will not be checked out. A select group of texts and reference books of particular importance to residents is kept by the residency program coordinator in the CMC Conference Room and can be checked out by Radiology Residents only.
4. Since the American College of Radiology Syllabi are primarily study books, both sets of ACR Syllabi will be circulated.
5. Books may be checked out for a two-week period. If no one else has requested that book, the check out period may be extended for another two weeks. At the end of the four-week period, the library book must be returned to the library.
6. To check out a library book, one must sign the card in the front of the book and list the sign-out date, beeper number and telephone extension on the card. The card is to be given to the Residency Coordinator.
7. At the end of the two-week check out period, the residency coordinator will contact those persons with overdue books.
8. It will be the responsibility of the person checking out the book to replace damaged or lost books.
9. No journals, bound or unbound, will be allowed to circulate with exception of time for duplication or production of slides within the Department.

The ACR Teaching File is available for residents’ study on line. In addition, ACR CDs are available for certain categories and may be used in the resident’s study or lounge, checked out from the program coordinator. The Department also pays for STAT Dx.

| Resident’s Reserve Library |

A resident’s reserve library (2nd floor CMC Radiology conference room), with textbooks applicable to most rotations, is also available. These books are kept and signed out by the Resident Coordinator (1-3214). Rules governing the use of these books are given below.

| Radiology Department Electronic Learning Laboratory |

The electronic learning laboratory is located in the Education Area of the Radiology department next to the Department Library, Classroom and ACR File. It holds all available electronic format teaching modules from ACR, as well as many textbooks in electronic format, Visiting Professor conferences on VHS and DVD format, and PowerPoint presentations from previous Resident Seminars. These resources are distributed among four state-of-the-art PC computers with DVD and CDRW capabilities, connected to our Radiology LAN, hospital network and Internet. This laboratory is accessible to all Radiology residents at all times with their own individual department keys.

| Book Sign-Out Policy |

1. The resident on the specified rotation has priority to sign out the book for the month in question.
2. Books may be signed out on the 1st Monday of the rotation, to be returned the last Friday of the rotation (Total: 4 weeks)
3. If the resident who has priority to sign out the book doesn’t want it, another resident may sign out the book in question if the resident on the rotation clears it with the Resident Coordinator.
4. If rotations are for two weeks, or two residents are on the same rotation, the book arrangements are to be worked out by the two residents in question.
5. The resident who signed out the text is responsible for the text.

| Return/Late Policy and Penalty Criteria |

1. Texts must be returned by the last Friday of the rotation.
2. If not returned . . .
   A. Resident will be paged on the immediate following Monday
   B. Resident will have until the immediate following Wednesday close of business (C.O.B.) to return the text.
Penalty: If the book is lost, stolen or late (after Wednesday C.O.B.) then:
1. Resident will not be permitted to check out another book for three (3) months from the due date.
2. Resident must immediately return or replace the book.
3. A third offense results in permanent loss of privileges.

| Vacation Time |

The allotted vacation time is fifteen (15) working days per year. Vacation time must be used within the academic year it is earned, or it will be lost. It cannot be carried over from one year to the next.
No resident vacation time is to be scheduled for June (excluding graduating residents), or the first two weeks in July. Restricted vacation time where coordination of resident vacation involves the whole department includes Masters Week, major national radiology meetings, Thanksgiving, Christmas and New Year holiday weeks and oral and written boards. Vacation times will be coordinated for each individual week where restricted vacation policy applies. “Vacation times” are indicated on the resident time-off calendar. Critical dates will be maintained by Program Coordinator. Critical dates are days in which residents may not schedule time off due to examinations or critical department shortages of residents and/or attendings.

In general, no more than four residents will be on vacation at the same time. This does not include residents who are off campus (such as the AIRP).

Time off will be scheduled at least one month ahead of time. In any event, any scheduled time off must have the approval of the faculty member in charge of the assigned section, the chief resident and the Program Director. Prior to entering time-off on the calendar, a time-off request form must be completed. Forms are available from the Residency Coordinator.

Residents rotating at the VAMC will have to obtain the approval of the Chief of Radiology Service at the VAMC in addition to the chief resident and Program Director at GRU. The residents as a group may take a total of 60 VA vacation days.

The Associate Chief of Staff at the VAMC approves authorized absence for illness. All time off will be logged on the resident’s time-off calendar kept by the Program Coordinator. When entering time-off on this calendar, indicate your name, rotation area and the days that are being taken by number. Log vacation days with the letter V, sick days with the letter S, meeting days with an M and interview days with the letter I.

<table>
<thead>
<tr>
<th>Interview Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residents are given a total of five (5) days during the residency for interviews for fellowships and/or jobs. Documentation is required as proof that the resident is going on an interview. If no documentation is submitted, this will be counted as vacation time.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time for Off Campus Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>During the four-year residency, limited time-off for educational meetings (Off Campus) is allowed. This time can be taken only with the approval of the residency Program Director and will be limited to educational experiences where the resident will be giving oral or poster presentations or is involved as an active member in a regional or national committee.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sick Leave</th>
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</thead>
<tbody>
<tr>
<td>When a resident is sick, it is the resident’s responsibility to call the Resident Coordinator at 721-2076 by 8 AM, if possible. If the resident does not notify the Program Coordinator directly, the day will be counted as vacation day. If the Resident Coordinator is not in the office, leave a detailed message on the answering machine or email. The Program Coordinator will notify the rotation assignment section chief, and the Program Director.</td>
</tr>
</tbody>
</table>
If the sick resident is on call, it is his/her responsibility to find a substitute for that duty. If no one can be found, the chief resident should be contacted and he or whomever he designates will take that call. In the chief resident’s absence the Program Director will assign the call. In any case, the substitute will have his/her call repaid on a day of his/her choosing excluding holiday call or a prearranged vacation day.

As per the house staff manual, 14 work days of sick leave may be taken per year. Sick leave can be carried over from one year to the next with a maximum of 21 days. Any additional leave beyond accrued sick leave time is subtracted from vacation days. If none are available, this time is deducted from pay as unpaid leave. Planned sick leave must be approved by the Program Director. Sick leave beyond three consecutive days requires a doctor’s excuse.

<table>
<thead>
<tr>
<th>Radiology Resident Temporary Medical Disability Leave</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Including Leave and Special Considerations for Pregnancy)</td>
</tr>
<tr>
<td>1. Sanctioned medical disability leave for residents shall consist of the resident’s scheduled vacation plus an additional time not to exceed 20 days. Any planned medical leave must be scheduled with the Program Director.</td>
</tr>
<tr>
<td>2. If a resident must be absent for longer than six weeks in any one-year including vacation, meetings and disability leave, he/she must make up the time in order to be considered board eligible (ABR requirement).</td>
</tr>
<tr>
<td>3. During pregnancy, fluoroscopy rotations will be rescheduled if the rotations are scheduled to occur during the first two trimesters.</td>
</tr>
<tr>
<td>4. During any medical disability leave period, residents may exchange call, to be paid back later.</td>
</tr>
</tbody>
</table>

| Radiology Moonlighting Policy |

ALL moonlighting activities must be approved by the Residency Program Director as well as the DIO PRIOR to accepting any moonlighting opportunity. A log of moonlighting activity, including hours of coverage, duties and location, must be maintained by the resident and submitted to the Program Coordinator’s office on a monthly basis. Moonlighting is not a training requirement, and is only used as a mechanism to provide real-life Radiology practice experience to selected individuals with adequate achievement of training goals. Moonlighting activities outside of the established department guidelines is grounds for disciplinary action. Moonlighting hours are calculated into duty hours and therefore must be reported.

| Pregnancy Notification |

Female radiology residents must notify program director, associate program director or program coordinator immediately upon learning of a positive pregnancy status. Special training/counseling and field monitoring badge must be obtained.

| Radiology Residency Policy Regarding Disciplinary Action/Dismissal Procedure |

Any of the following may be cause for disciplinary action or dismissal of a house officer:
1. Any act by a resident which would constitute a felony or crime involving moral turpitude under the laws of the United States, the State of Georgia, or any other jurisdiction may be sufficient cause for dismissal.
2. Failure to perform in an ethical manner, consistent with the standards established by the American Medical Association, may be sufficient cause for dismissal.
3. A resident may be dismissed if, in the opinion of the Resident Evaluation Committee, the resident’s knowledge, character, behavior, or mental or physical fitness cast grave doubts upon his/her potential capacity as a radiologist.

4. Any act or failure to act by a resident who, in the opinion of the faculty, would have unnecessarily endangered the life or health of the patient may be grounds for immediate suspension, pending consideration for dismissal.

5. Failure to fulfill established resident duties (unjustified absence from call, daily duties, didactic activities, unauthorized moonlighting, etc.) will constitute grounds for disciplinary action.

### Department Procedures

1. The resident will be advised in writing of the charges against him/her, including a statement of alleged facts and the standards or policies violated. The report is to include a statement of findings of fact, conclusions and recommendations.

2. A Departmental Hearing Committee appointed by the Chairman will evaluate the case and make a recommendation to the Chairman. The Committee will be appointed within 24 hours, once the written charges have been given to the resident. The Committee will submit a report of its findings to the Chairman within five (5) working days after having been appointed.

3. The resident will be given the opportunity to appear before the committee and, if he/she desires, to bring an advisor.

4. The evidence against the resident will be presented to the committee and witnesses, where appropriate, may be called to testify. The proceedings will be recorded and an official written summary will be prepared.

5. The resident will have the opportunity to be present when the witnesses are questioned and to question them personally.

6. The resident will be provided the opportunity to present such documentary evidence as might be relevant to the case.

7. Formal rules of evidence will not be followed, but the committee will allow into evidence any information that they believe will be of probative value in deciding the issues.

8. While the resident will be present throughout the proceedings, the committee will conduct its deliberations in private.

9. Residents will be allowed to challenge the participation of any committee member for cause.

10. Within seven (7) days after receiving the committee’s recommendations, the Program Director will deliver the final decision and advise the resident, in writing.

11. After a departmental decision has been rendered, the resident may appeal that decision to the Dean of the School of Medicine. The resident may make further appeal to the President of MCG and further to the Board of Regents if desired.

### Appeal Procedures

Within thirty (30) working days after being notified of the Chairman’s final decision, a house officer may appeal in writing to the Dean of the School of Medicine. The appeal should state the Chairman’s decision and the reasons the house officer is asking that the decision be reversed.

Within ten (10) working days after receiving the written appeal, the Dean shall refer the matter to the ad hoc faculty committee of three to five persons who shall review the appeal and make recommendations to the Dean. The Dean shall review the recommendations of the committee and render a final decision thereon and notify the house officer and the Chairman of his department in writing within ten (10) working days.
Within ten (10) working days after the date of the Dean’s written decision, the house officer may submit an appeal in writing to the President. Within ten (10) working days, the President shall advise the house officer in writing of his final decision.

The President’s decision may be appealed to the Board of Regents under Article IX of the Bylaws of the Board:

“Any person in the University System for whom no other appeal is provided in the Bylaws and who is aggrieved by a final decision of the president of an institution, may apply to the Board of Regents, without prejudice to his/her position, for a review of the decision. The application for review shall be submitted in writing to the Executive Secretary of the Board within a period of twenty days following the decision of the president. It shall state the decision complained of and the redress desired. A review by the Board is not a matter of right, but is within the sound discretion of the Board. If the application for review is granted, the Board or a committee of the Board or a Hearing Officer appointed by the Board, shall investigate the matter thoroughly and report its findings and recommendations to the Board. The Board shall render its decision thereon within sixty days from the filing date of the application for review or from the date of any hearing that may be held thereon. The decision of the Board shall be final and binding for all purposes.”
<table>
<thead>
<tr>
<th>2010-2011 Residents - Chief Resident*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abraham, Bradford DO</td>
</tr>
<tr>
<td>Cell Phone: 404 432-0798</td>
</tr>
<tr>
<td>Beeper 1900</td>
</tr>
<tr>
<td>PGY 5 – 4th-year resident</td>
</tr>
<tr>
<td>Burch, Heather DO (Derek)</td>
</tr>
<tr>
<td>Cell Phone: 706 941-1597</td>
</tr>
<tr>
<td>Beeper: 1584</td>
</tr>
<tr>
<td>PGY 5 – 4th-year resident</td>
</tr>
<tr>
<td>Carlton, Chaltsy, DO (Monty)</td>
</tr>
<tr>
<td>Cell Phone: 339 456-0304</td>
</tr>
<tr>
<td>Beeper: 1242</td>
</tr>
<tr>
<td>PGY 5 – 4th-year resident</td>
</tr>
<tr>
<td>Dao, Tuan, MD (Vy)</td>
</tr>
<tr>
<td>Cell Phone 909 228-8986</td>
</tr>
<tr>
<td>Beeper: 1901</td>
</tr>
<tr>
<td>PGY 5 – 4th-year resident</td>
</tr>
<tr>
<td>Patel, Sumir MD (Mohini)</td>
</tr>
<tr>
<td>Cell Phone: 706 631-5622</td>
</tr>
<tr>
<td>Beeper: 1903</td>
</tr>
<tr>
<td>PGY 5 – 4th-year resident</td>
</tr>
<tr>
<td>Edwards, Jamie (DO)</td>
</tr>
<tr>
<td>Cell</td>
</tr>
<tr>
<td>Beeper 1704</td>
</tr>
<tr>
<td>PGY 4 – 3rd Year Resident</td>
</tr>
<tr>
<td>Parker, William MD</td>
</tr>
<tr>
<td>Cell</td>
</tr>
<tr>
<td>Beeper 1450</td>
</tr>
<tr>
<td>PGY 4 – 3rd Year Resident</td>
</tr>
<tr>
<td>Randazzo, William (Megan)</td>
</tr>
<tr>
<td>Cell</td>
</tr>
<tr>
<td>Beeper 1590</td>
</tr>
<tr>
<td>PGY 4 – 3rd Year Resident</td>
</tr>
<tr>
<td>Buzzelli, Marc (Heidi)</td>
</tr>
<tr>
<td>Cell</td>
</tr>
<tr>
<td>Beeper 5564</td>
</tr>
<tr>
<td>PGY 3 – 2nd Year Resident</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2013-2014 Fellows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fields, Braxton</td>
</tr>
<tr>
<td>Cell</td>
</tr>
<tr>
<td>Beeper 1213</td>
</tr>
<tr>
<td>PGY 6 – Neuroradiology Fellow</td>
</tr>
<tr>
<td>Department of Radiology Faculty</td>
</tr>
<tr>
<td>--------------------------------</td>
</tr>
<tr>
<td>Rawson, James MD (Jeanne)</td>
</tr>
<tr>
<td>Warren Professor and Chairman</td>
</tr>
<tr>
<td>Department of Radiology</td>
</tr>
<tr>
<td>Alleyne, Cargill MD</td>
</tr>
<tr>
<td>Chair</td>
</tr>
<tr>
<td>Department of Neurosurgery</td>
</tr>
<tr>
<td>Allison, Jerry Ph.D. (Jacquie)</td>
</tr>
<tr>
<td>Professor and Chief</td>
</tr>
<tr>
<td>Medical Physics</td>
</tr>
<tr>
<td>Araque, Julio MD (Dr. Ledy)</td>
</tr>
<tr>
<td>Assistant Professor</td>
</tr>
<tr>
<td>Neuroradiology and Pediatric Radiology</td>
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<tr>
<td>Bates, William MD (Rhonda)</td>
</tr>
<tr>
<td>Assistant Professor</td>
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<tr>
<td>Body Imaging</td>
</tr>
<tr>
<td>Battu, Prabhakar MD (Shoba)</td>
</tr>
<tr>
<td>Assistant Clinical Professor</td>
</tr>
<tr>
<td>VAH Chest Radiology</td>
</tr>
<tr>
<td>Cao, ZongJian Ph.D.</td>
</tr>
<tr>
<td>Associate Professor</td>
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<tr>
<td>Medical Physics</td>
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<tr>
<td>Cashikar, Anil Ph.D.</td>
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<tr>
<td>Assistant Professor</td>
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<tr>
<td>CMCRCV</td>
</tr>
<tr>
<td>Corley, James M.Sc. (Jayne)</td>
</tr>
<tr>
<td>Assistant Professor</td>
</tr>
<tr>
<td>Nuclear Pharmacy</td>
</tr>
<tr>
<td>Craft, James MD (Mary Theresa)</td>
</tr>
<tr>
<td>Assistant Professor</td>
</tr>
<tr>
<td>Mammography</td>
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<tr>
<td>David, George M.S.</td>
</tr>
<tr>
<td>Assistant Professor</td>
</tr>
<tr>
<td>Medical Physics</td>
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<tr>
<td>Figueroa, Ramón E., MD (Diana)</td>
</tr>
<tr>
<td>Professor and Chief</td>
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<tr>
<td>Neuroradiology Service</td>
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<tr>
<td>Forseen, Scott, MD (Caralee)</td>
</tr>
<tr>
<td>Assistant Professor</td>
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<tr>
<td>Neuroradiology</td>
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<tr>
<td>Gilbert, B Curtiss MD</td>
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<tr>
<td>Assistant Professor</td>
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<tr>
<td>Neuroradiology</td>
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<tr>
<td>Gupta, Sathy MD (Mayura)</td>
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<tr>
<td>Associate Professor</td>
</tr>
<tr>
<td>VAH Ultrasound</td>
</tr>
<tr>
<td>Joe, Clarence MD, D.M.D.</td>
</tr>
<tr>
<td>Associate Professor</td>
</tr>
<tr>
<td>Musculoskeletal Radiology</td>
</tr>
<tr>
<td>Karmin, Paul MD</td>
</tr>
<tr>
<td>Assistant Professor</td>
</tr>
<tr>
<td>Body Imaging</td>
</tr>
<tr>
<td>Jayanth Keshavamurthy, MD</td>
</tr>
<tr>
<td>Assistant Professor</td>
</tr>
<tr>
<td>General Radiology</td>
</tr>
<tr>
<td>Klein, Kandace DO</td>
</tr>
<tr>
<td>Assistant Professor</td>
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<tr>
<td>Body Imaging</td>
</tr>
<tr>
<td>Lewis, Kristopher MD (Mary)</td>
</tr>
<tr>
<td>Assistant Professor</td>
</tr>
<tr>
<td>Pediatric Radiology</td>
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<tr>
<td>Lynn, Matthew MD</td>
</tr>
<tr>
<td>Assistant Professor</td>
</tr>
<tr>
<td>Pediatric Radiology</td>
</tr>
<tr>
<td>Markle, Janet MD (Guy Turner)</td>
</tr>
<tr>
<td>Assistant Clinical Professor, MCG</td>
</tr>
<tr>
<td>VAH Body Imaging/MSK</td>
</tr>
<tr>
<td>Mathews, Katherine, MD</td>
</tr>
<tr>
<td>Assistant Clinical Professor, MCG</td>
</tr>
<tr>
<td>VAH Nuclear Medicine</td>
</tr>
<tr>
<td>Melenevsky, Yulia MD (Boris)</td>
</tr>
<tr>
<td>Assistant Professor</td>
</tr>
<tr>
<td>Musculoskeletal</td>
</tr>
</tbody>
</table>
Mivechi, Nahid E. Ph.D.
Professor
Radiobiology

Munroe, Janet MD (Steve)
Assistant Professor
Body Imaging
Associate Program Director

Nichols, Fenwick MD.
Professor
Neurology/Neurovascular Radiology

Nieves, Nestor MD (Wanda)
Assistant Professor
Neuroradiology

Panzitta, Karen MD
Assistant Professor
Mammography

Pucar, Dakar, MD (Lanie)
Assistant Professor
Nuclear Medicine/PET

Rahimi, Scott MD
Assistant Professor
Department of Neurosurgery

Robinson, Vincent M.B.B.S. (Anna Maria)
Professor
Cardiologist, Nuclear Cardiology

Sostre, Gilberto MD (Zulma)
Associate Professor and Chief
Body Imaging and Pediatric Radiology
Residency Program Director

Sharma, Gyanendra
Associate Professor
Cardiology

Solis, Veronica
Assistant Clinical Professor, MCG
VAH Body Imaging

Stincer, Eduardo MD
Assistant Clinical Professor, MCG
VAH Body Imaging

Thomson III, Norman MD (Kim)
Associate Professor
General Radiology

Williams, Hadyn MD
Associate Professor
Chief, Nuclear Radiology, PET Imaging

Yanasak, Nathan Ph.D.
Assistant Professor
Medical Physics, fMRI
1. Demonstrate learning of the knowledge based objectives
2. Review the request and all applicable clinical history and previous laboratory tests and previous imaging studies to be certain that the proper test has been ordered and that the patient’s condition is such that the examination is safe and that any necessary preparation for the test has been completed before starting the examination. If the indication for the examination is unclear contact the referring physician or another of the patient's appropriate and knowledgeable health care providers.
3. Perform all examinations in the appropriate way. If you have a question - ask before performing the examination.
4. The dictated reports should be accurate, concise and contain appropriate level of detail
5. Accurately dictate all studies in a timely fashion
6. Communicate effectively and courteously with referring clinicians
   a. Including obtaining relevant history for study interpretation
   b. Regarding important findings on studies performed
   c. Discuss results with referring physicians or appropriate team members with documentation of critical results in exam report
7. Demonstrate learning of the clinical indications for ordering and using radiological examinations including advanced CT imaging
8. Demonstrate responsible work ethic.
   This would include being present at the CT station at 7:30 A.M, or after lecture when applicable, and throughout the work day, completion of dictation of all reviewed studies in a timely manner, attendance at all departmental teaching conferences, and grand rounds presentations.
9. Facilitate the learning of medical students, peers, other professionals participating in the CT service including technologists and fellows.
10. Build confidence in reading routine and STAT CT studies.
11. Contribute AT LEAST 1 case per rotation to the Radiology Department Interesting Case File
12. Start Reviewing the ACR teaching files
13. Review ACR Appropriateness Criteria and Standards regarding CT (including the Communications Standard.)
14. Follow up results of surgery or examinations performed by other clinical services to determine final diagnosis.

The above rotational goals incorporate the core competencies as follows:
Medical Knowledge – Goals 1 through 13
Interpersonal and Communication skills – Goals 2, 4, 5, 8, and 12
Practice Based Learning and Improvement – Goals 2, 3, 4, and 13
Professionalism – Goals 5, 7, 8
Patient Care – Goals 2, 3, 4, 9

First Year Radiology Resident (Rotation 1)

Medical Knowledge
Interpersonal, and Communication Skills, Professionalism

Goals:
- The resident shall spend one full morning (7:30 am – 11:30 am) in the CT scanner learning the acquisition and timing of different contrast phases.
- The resident will know axial CT anatomy to include normal chest, abdomen, and pelvis anatomy.
- Learn the basic principles of contrast distribution particularly as applied to arterial and venous phase scanning.
- Protocol and monitor CT studies. Modify protocols when appropriate.
- Learn to recognize and treat contrast reactions.
- Develop skills in interpretation of basic CT pathology.
- Learn the appropriate format for dictation of CT reports.
- Develop skills in consultation with house staff and referring physicians.
- Learn principals and guidelines for imaging pregnant patients in emergency setting.

Medical Knowledge

Objectives:
- Basic trauma
  - Pneumothorax/pulmonary contusions
  - Acute traumatic aortic injury
  - Liver/pancreas/spleen injury
  - adrenal/renal/bladder injury
  - Bowel injury
  - Acute atrial bleeding
- Aortic aneurysm
- Aortic dissection
- Ascites
- Appendicitis
- Diverticulitis
- Pancreatitis/pseudocyst
- Cholecystitis
- Urinary collecting system stones/hydronephrosis
- Bowel obstruction
- Bowel perforation
- Pulmonary embolism
- Retroperitoneal hematoma
- CT artifacts
Colon carcinoma
➢ Esophageal carcinoma
➢ Liver cancer
➢ Lung cancer
➢ Pancreas cancer
➢ Gastric cancer
➢ Lymphoma
➢ Retroperitoneal adenopathy
➢ Adrenal adenoma
➢ Gallstones
➢ Cavernous hemangioma of the liver
➢ Cirrhotic liver
➢ Liver metastases
➢ Renal cystic disease
➢ Shock bowel

First Year Radiology Resident (Rotation II)

Medical Knowledge, Interpersonal and Communication Skills, Professionalism, Patient Care

Goals:

➢ Refine interpretive skills with complex pathology.
➢ Understand the principles of computed tomographic angiography
➢ Be able to identify life-threatening findings, particular in trauma patients
➢ Provide emergent provisional interpretation as needed
➢ Be able to direct the choice of imaging modality and protocol emergent studies
➢ Understand where referral to other imaging modalities is necessary.

Medical Knowledge

Objectives

Identify the CT appearance of the following pathology:

➢ Hepatic abscess
➢ Pancreatic abscess
➢ Renal abscess
➢ Groin pseudoaneurysm
➢ Biliary cancer
➢ Budd Chiari Syndrome
➢ Carcinomatosis with ascites
➢ Sequel of cryoablation
➢ Diaphragmatic hernia
➢ Interloop abscess
➢ Focal nodular hyperplasia of the liver
➢ Hepatocellular carcinoma
➢ Islet cell tumor of the pancreas
➢ Renal oncocytoma
➢ Complications of renal transplantation
➢ Liver transplant complications
➢ Cystic pancreatic neoplasm
➢ Renal hypertension and varices
➢ Retroperitoneal fibrosis
➢ Von Hippel Lindau Syndrome
Second Year, Third and Fourth Year Radiology Residents

Medical Knowledge, Interpersonal and Communication Skills, Professionalism, Patient Care

Goals:

- Continue to expand the knowledge of CT anatomy and pathology begun in the first two rotations.
- Assist fellows and technical staff in the performance of CT angiography and its interpretation
- Participate in CT guided biopsy procedures

Medical Knowledge

Objectives

Identify the CT appearance of the following pathology:

- CT angiography of endovascular stent placement
- CT angiography of renal donor evaluation
- CT angiography of liver transplant candidate
- Renal artery stenosis
- Accessory renal arteries
- Thoracic outlet syndrome
- CTA runoff evaluation with 3D reconstructions
- CT enterography
- CT fistulograms
- CT enema
- CT urography
- Cardiac CT with 3D reconstructions

Body CT Suggested Reading

- Fundamentals of Body CT. Webb WR, Brant WE, Helms CA. 2006
- Diagnostic and Surgical Imaging Anatomy Chest, Abdomen, Pelvis. Federle, et.al. 2006
- Diagnostic Imaging Emergency. Jeffrey, et.al. 2007
- Diagnostic Imaging Cardiovascular. Abbara, et al. 2008

Most of the resident teaching is done one on one using the case material at hand, with supplementation from personal or departmental teaching files. The resident is also expected to learn by teaching the medical students on service. Conferences that are useful during this rotation include:

- GYN Conference Tuesday 7 am
- Chest Conference Friday 7 am
- Surgery/Urology Tumor Board Wednesday 4 pm

At the beginning of the rotation, the resident will receive an email reminder to review rotation objectives and goals. The resident will be assessed at mid and at end of rotation by the faculty. In the unusual case of substandard performance, the evaluation will be brought to the attention of the Program Director and the resident for further counseling.
Goals and Objectives for ALL Abdominal Imaging GI/GU/Fluoro Rotations

1. Demonstrate learning of the abdominal and GI/GU knowledge based objectives.
2. Learn and demonstrate knowledge of radiation protection and ways to reduce radiation exposure to both patients and hospital personnel. The resident will be appropriately supervised to assure that safe practices are adhered to.
3. Become knowledgeable about the use of different radiographic contrast agents, including their indications, contraindications, dosages, side effects, treatment of adverse reactions and contrast allergy prevention/premedication techniques.
4. Review the request, applicable clinical history, previous laboratory tests and previous imaging studies to be certain that the proper test has been ordered, including relevant clinical indications for fluoroscopy examinations, including upper and lower contrast fluoroscopy, IVP, HSG, cystography and cholangiography. If the indication for the examination is unclear contact the referring health care providers. Review the relevant ACR Appropriateness Criteria and Standards regarding abdominal and GI/GU imaging available at www.acr.org
5. Demonstrate proficiency at detecting abnormalities demonstrated by chest and abdominal scout plain films.
6. Perform hand washing before and after all patient examinations.
7. Become familiar with the operation of all fluoroscopic equipment.
8. Acquire an understanding of the proper preparation of patients for fluoroscopic examinations and appropriate follow-up afterwards.
9. Obtain a comprehensive understanding of the anatomy and physiology being examined in each fluoroscopic procedure, to specifically include the function and design behind each chosen position or maneuver utilized during fluoroscopic examinations.
10. Learn the fluoroscopic techniques for performing high quality, state-of-the-art diagnostic examinations in the abdomen and GI/GU systems tracts.
11. Learn current methods for performing fluoroscopically-guided interventional diagnostic and therapeutic procedures. This will include observing HSG cannulation, followed by performing the patient cannulation and subsequent HSG after the first rotation.
13. Communicate effectively and courteously with referring clinicians, to include obtaining relevant history for study interpretation and communication of important findings on studies performed. Serve as a consultant to referring physicians regarding abdominal and GI/GU imaging.
14. Demonstrate responsible work ethic. This includes being present at the abdominal and GI/GU work area at 7:30 A.M, or after lecture when applicable and throughout the work day and attendance at all departmental teaching conferences and grand rounds presentations.
15. Facilitate the learning of medical students, peers and others in the abdominal and GI/GU service.
16. Contribute AT LEAST 1 case per rotation to the Radiology Department Teaching File
17. All areas of study are directed towards obtaining ABR certification. This will include review of the ACR abdominal and GI/GU teaching files.
18. Follow up results of surgery or examinations performed by other clinical services to determine final diagnosis.
19. If the resident is pregnant or could become pregnant, it is essential to confidently inform your abdominal imaging faculty. If applicable, the resident will need to obtain a fetal dose radiation badge and/or view a radiation safety video pertaining to pregnancy.
The Abdominal Imaging GI/GU/Fluoro goals incorporate the following core competencies

1. Medical Knowledge: Goals 1 through 19
   Interpersonal and Communication Skills: Goals 4, 8, 11, 12, 13, 15 and 18
   Practice Based Learning and Improvement: Goals 2, 3, 4, 9, 11, 12, 13 and 18
   Professionalism: Goals 2, 3, 4, 5, 6, 7, 10, 11, 12, 13, 14, 15 and 19
   Patient Care: Goals 2, 3, 4, 6, 8, 10, 11 and 18

The Abdominal Imaging GI/GU/Fluoro resident assessment utilizes the following techniques

A. Assessment tools utilized include global ratings by faculty including rotation evaluation sheet, conference attendance logs and In-service examination results.
B. Plan includes Develop 360 degree evaluations by staff to include: all technologists on day shift in radiology core, technology supervisor for radiology, and body imaging fellows (if applicable).
C. At the beginning of the rotation the resident will review the Resident Manual in order to define the rotation objectives and expectations. The resident will have a mid rotation discussion of his/her performance. At the end of the rotation, the abdominal GI/GU faculty members of the section will meet with the resident and discuss the resident’s performance during the month. In the unusual case of a substandard performance, this will be brought to the attention of the Residency Program Director and the resident for further counseling.
D. Benchmarks for Resident Self Evaluation: During every training rotation, the resident is expected to utilize the suggested resources. This will include the ACR Abdominal GI/GU teaching file in later rotations. Over time, he/she should become progressively more knowledgeable about normal abdominal and GI/GU anatomy, applied physics, physiology, radiation safety principles, safe and effective use of oral and IV contrast, treatment and prevention of contrast reactions and the radiographic appearances of disease processes evaluated utilizing fluoroscopy and other GI/GU techniques as correlated with related CT, US or other available imaging examinations. This requires knowledge within many organ systems. In addition, he/she should increasingly understand clinical presentations and current modes of treatment. During every rotation, the resident is expected to share knowledge with medical and tech students, as well as more junior residents. In the first rotation the resident will be introduced to operation of the fluoroscopy machine, followed by increasingly autonomous conduct of abdominal and GI/GU imaging assignments.

General outline Conditions and Pathology in the Adult Abdominal Imaging GI/GU/Fluoro patient include:

- Normal anatomy and normal variants (including embryologic basis) that may simulate disease states.
- Radiation safety and ALARA operation of fluoroscopic equipment.
- Safe and appropriate use of oral and IV contrast.
- Congenital anomalies/diseases.
- Traumatic injuries.
- Metabolic disorders
- Indications for emergency abdominal imaging.
- Benign or malignant masses.
- Infection and inflammation.
- The pancreatic and biliary tracts and associated states of disease.
- Issues pertaining to fertility or loss of fertility and hysterosalpingography.
- Iatrogenic injuries and post-surgical change appearances related to the GI/GU tracts.
- Obstruction, perforation, leak, stricture, hernias and related pathology.
• Utilization, appropriateness criteria and protocol for ordering abdominal and related GI/GU examinations for various clinical conditions.

**First Year Radiology Resident (Rotation 1)**

**Key Rotation Objectives:** The resident should become familiar with the operation of all the fluoroscopic equipment. He/she should acquire knowledge and demonstrate the use of principles of radiation protection and ways to reduce radiation exposure to both patients and personnel. The resident should learn the normal anatomy and normal anatomical variations in the appearance of the GI/GU. He/she should observe and learn the techniques to perform and interpret high-quality diagnostic examinations of the upper and lower gastrointestinal tract. He/she should become knowledgeable about the different contrast agents available, including their indications, contraindications, dosages, and side effects. He/she should begin to recognize abnormalities that are demonstrated on chest and abdominal plain films and contrast studies of the alimentary tract. The resident should learn how to perform and interpret modified barium swallow [Modified BaSw] evaluations of swallowing motility in conjunction with the Speech Pathology department, hysterosalpingography [HSG] in conjunction with the Reproductive Medicine service, intravenous pyelography (IVP), T-tube cholangiography, fistulograms, cystography, defecography and voiding cystourethrography (VCUG). The resident should learn how to interpret (but not perform) images from ERCP examinations, retrograde/antegrade pyelography and urethrogram studies. He/she should become proficient in dictating reports of significant fluoroscopic and radiographic findings in a concise and clear manner. The resident should always determine when/if the patient has had a biopsy before fluoroscopic examinations are performed since this may be a contraindication to air contrast examination.

There is a fluoroscopy phantom in the GI/GU work area designed to practice fluoroscopy and radiation safety. Ask the Fluoroscopy technologist and your fluoroscopy faculty and begin on your 1st day.

**Educational Resources**

1. Textbook of GI Imaging by Gore & Levine, chapters 1-5, 15-18, 41, 55, 56.
3. "The Requisites: Gastrointestinal Imaging" by Halpert 2006 chapter 1 {Esophagus and Gastroesophageal Junction}, chapter 2 (Stomach and Duodenum), chapter 3 (Small Bowel), chapter 4 (pancreas), chapter 6 (Biliary System and Gall Bladder), chapter 7 (Colon and Rectum) and chapter 8 (Miscellaneous Topics).
5. Review the PowerPoint presentations entitled "Normal GI Anatomy" and “Contrast reactions” with Supplementary PowerPoint presentations that include "Colon Disease", "Esophagus", "Neoplastic and Non-Neoplastic Gastric Disease", and "Polypoid Disease of the SB and Colon", all available on the PC in the fluoroscopy work area.
6. "Common Patterns in Report Dictation July 2010".
10. “Management of Acute Contrast Reactions” and "ABCD Contrast Reaction Treatment Algorithm = 4-page chart.

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14. “Cystogram Contrast technique and Dilution” = 1-page chart.
19. “Safety before BE Balloon Insertion and Distention” = 1-page BE tip safety policy.
20. “Weight Limits for Imaging Equipment as of June 2010”
21. “Fluoroscopy Policy” = 2-page fluoroscopy policy for MCG.
25. “Esophageal Disruption: Evaluation with Iohexol Esophagography”
26. “Fluor Techniques-Overview” = 8-page chart of how to perform each fluoro exam and what films to take.
27. "Role of Barium Esophagography in Evaluating Dysphagia" by Allen 2009 Cleveland Clinic of Internal Medicine Volume 76-number 2: pages 105-111.
28. “How to Perform Modified BaSw with Speech Pathologist” = 2-page procedure notes.
29. “Clinical and Videofluoroscopic Evaluation of Swallowing Disorders” -1993
30. “Double Contrast Barium Enema Examination Technique”
31. “Practical Tips How to Perform Barium Defecography”

Supplementary Educational Resources

1. A global resource for all areas in GI imaging is “Textbook of GI Imaging” by Gore & Levine 2008.
3. Brant and Helms, 3rd Edition 2007, chapter 29 (Pharynx and Esophagus), chapter 30 (Stomach and Duodenum), chapter 31 (Mesenteric Small Bowel), chapter 32 (Colon and Appendix).

Second Year, Third Year and Fourth Year Radiology Resident Rotations

Key Rotation Objectives: The resident should continue to improve his/her skills for performing and interpreting fluoroscopic and radiographic examinations of the GI/GU tracts. He/she should learn to tailor examinations to answer all questions being asked by the clinician and to anticipate those questions that should have been asked but were not. He/she should begin to detect abnormalities while the fluoroscopic procedures are in progress and extend/modify examinations as clinically required. Disease recognition skills should continue to increase on chest and abdominal plain film and contrast studies. The resident should begin to develop meaningful differential diagnoses for the pathology that is found. He/she should observe fluoroscopically-guided interventional procedures and assist more senior residents and faculty in these techniques. Complementary CT, MR and US imaging of the GI/GU tracts should be reviewed in detail in order to learn how plain film and contrasted fluoroscopic techniques are enhanced when performed and interpreted in light of other advanced imaging technologies. The resident should observe and cannulate the uterus as part of the HSG procedure, in conjunction with the reproductive medicine faculty member. The resident should perfect his/her diagnostic examination techniques and be highly skilled and efficient in performing and interpreting all diagnostic and interventional procedures GI/GU performed in the fluoroscopy Suite. He/she should now be proficient in detecting abnormalities on abdominal plain films and contrast studies during fluoroscopy and extending/modifying examinations as clinically required. The development of appropriate differential diagnostic lists should be well advanced. The resident should continue to develop skills in interventional procedures under the guidance of more experienced radiologists. Along with the faculty, he/she will teach these skills to the more junior residents. He/she should know the proper preparation of patients for diagnostic and interventional procedures and the appropriate follow-up afterwards. He/she should act as a consultant in GI/GU radiology to the referring clinical
services. By the end of this rotation, the resident should have a broad understanding of abdominal and pelvic manifestations of genitourinary and alimentary tract diseases, their clinical features, radiographic manifestations, and current modes of treatment. Complementary CT, MR and US imaging of the GI/GU tracts should be reviewed in their entirety in order to learn how plain film and contrasted fluoroscopic techniques are enhanced when performed and interpreted in light of other advanced imaging technologies. The resident should observe and cannulate the uterus as part of the HSG procedure, in conjunction with the reproductive medicine faculty member. The resident should cultivate an evolving synthesis between body imaging and classical GI/GU modalities. He/she will complete final preparations to pass the certifying examination of the American Board of Radiology.

Educational Resources

2. “Videofluoroscopy and Swallowing Studies for Neurologic Disease: A Primer”
3. “MBS Measurement Tool for Swallow Impairment-MBSImp-Establishing a Standard” = MBS Measurement Standards
4. “Modified Barium Swallow Impairment Profile:MBSImp” = 2-page chart = MBS Impression Chart.
6. “CT Enteroclysis in Incomplete Small Bowel Obstruction” = CT Enteroclysis of Small Bowel.
7. “Multidetector CT Enteroclysis vs. Barium Enteroclysis with Methylcellulose in Patients with Suspected Small Bowel Disease” = SB Enteroclysis vs CT Enteroclysis by Minordi.
12. “MR Appendicitis in pregnancy 2010” x 62 slides by Dr. Rawson

Supplementary Educational Resources

1. Review resources from first rotation as required.
2. A global resource for all areas in GI imaging is “Textbook of GI Imaging” by Gore & Levine 2008.
3. AFIP GU Syllabus”.
4. "The Requisites: Gastrointestinal Imaging" by Halpert 2006 chapter 1 {Esophagus and Gastroesophageal Junction}, chapter 2 (Stomach and Duodenum), chapter 3 (Small Bowel), chapter 4 (pancreas), chapter 6 (Biliary System and Gall Bladder), chapter 7 (Colon and Rectum) and chapter 8 (Miscellaneous Topics).
6. ACR Syllabi #49, 43, 39 and 33 = A pair of GU and GI resources with a boards-oriented format.
7. ACR Syllabi #49, 43, 39 and 33 = A pair of GU and GI resources with a boards-oriented format.

Cardiac Imaging Rotation

Submitted by: Dr. Rawson and Dr. Henderson
September 4, 2012

Special Instructions for Rotation:

• Report to General Radiology at 7:30 am on the first day of the rotation to begin reviewing ICU radiographs
• Call MRI techs on the day before rotation starts to check to see if there are any cardiac MRIs scheduled
• Call CT techs at 7:30 am to see if there are any CCTA's scheduled
• Notify Drs. Bates, Thomson and Rawson that you are on the rotation and any scheduled time off for the rotation.
• Send Dr. Rawson an e-mail one week before the rotation and he will e-mail you the first batch of articles.

**Evaluation Resident for Rotation:**

• Residents are to ask their attendings for verbal feedback at the midpoint of the rotation.
• Written evaluations of the resident will be completed by the faculty in One45.

**Evaluation Faculty for Rotation**

• Written evaluations of the resident will be completed by the faculty in One45.

**Goals:**

• Be able to correlate multi-modality cardiac imaging including chest x-ray, MRI, CCTA, and Nuclear Medicine
• Be able to discuss management of cardiac diseases based on common imaging findings

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**Cardiac Imaging Rotation**  
Submitted by: Dr. Rawson and Dr. Henderson  
September 16, 2011

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**Rotation Specific Knowledge-Based Objectives:**

**At the end of the rotation, the resident should be able to:**

1. Know Cardiac MRI Imaging Techniques  
2. Know MRI appearance of Pathology on Cardiac MRI  
3. Know Coronary Artery Anatomy, variants and Pathology  
4. Recognize appearances of common diseases on Cardiac MRI  
5. Know Pathophysiology of Cardiovascular Disease  
6. Review and dictate ICU CXR under faculty supervision  
7. Triage, monitor and interpret Coronary Artery CTA under faculty supervision

**Technical and Non-interpretative Objectives, First Rotation:**

**At the end of the rotation, the resident should be able to:**

Monitor Cardiac MRI exams  
8. Dictate Cardiac MRI exams  
9. Monitor CCTA and process data  
10. Dictate CCTA  
11. Communicate results to ordering physician

**Decision Making/Value judgment skills, First Rotation**

**At the end of the rotation, the resident should be able to:**

13. Make protocol adjustments for Cardiac MRI when monitoring exam.  
14. Make protocol adjustments for CCTA when monitoring exam

**Other Activities:**

15. Attend cardiac CT/MRI conference and present cases  
16. Attend Cardiac Nuclear medicine read out when possible.
These materials (or equivalent) should be read during the rotation:

15. UCSF DVDs #11 (Cardiac Imaging) and #7 (Congenital Heart Disease)

Textbooks:

This rotation incorporates the core competencies as follows:

Medical knowledge – Goals 1-5
Interpersonal and Communication skills – Goals 5, 12
Problem Based Learning and Improvement – Goals 7, 13, 14
Professionalism – Goals 12
Patient Care – Goals 7-12
System Based Practice – Goals 15, 16

Special Instructions for Rotation:
- Report to General Radiology at 7:30 am on the first day of the rotation to begin reviewing ICU radiographs
- Call MRI techs on the day before rotation starts to check to see if there are any cardiac MRIs scheduled
- Call CT techs at 7:30 am to see if there are any CCTA scheduled
- Notify Drs. Bates, Thomson and Rawson that you are on the rotation and any scheduled time off for the rotation.
- Send Dr. Rawson an e-mail one week before the rotation and he will e-mail you the first batch of articles.

Evaluation Resident for Rotation:
- Residents are to ask their attendings for verbal feedback at the midpoint of the rotation.
- Written evaluations of the resident will be completed by the faculty in One45.

Evaluation Faculty for Rotation
- Written evaluations of the resident will be completed by the faculty in One45.

Goals:
- Be able to correlate multi-modality cardiac imaging including chest x-ray, MRI, CCTA, and Nuclear Medicine
- Be able to discuss management of cardiac diseases based on common imaging findings

Rotation Specific Knowledge-Based Objectives:
At the end of the rotation, the resident should be able to:

12. Know Cardiac MRI Imaging Techniques
13. Know MRI appearance of Pathology on Cardiac MRI
14. Know Coronary Artery Anatomy, variants and Pathology
15. Recognize appearances of common diseases on Cardiac MRI
16. Know Pathophysiology of Cardiovascular Disease
17. Review and dictate ICU CXR under faculty supervision
18. Triage, monitor and interpret Coronary Artery CTA under faculty supervision

Technical and Non-interpretative Objectives, First Rotation:
At the end of the rotation, the resident should be able to:

Monitor Cardiac MRI exams
19. Dictate Cardiac MRI exams
20. Monitor CCTA and process data
21. Dictate CCTA
22. Communicate results to ordering physician

Decision Making/Value judgment skills, First Rotation
At the end of the rotation, the resident should be able to:

17. Make protocol adjustments for Cardiac MRI when monitoring exam.
18. Make protocol adjustments for CCTA when monitoring exam

Other Activities:
19. Attend cardiac CT/MRI conference and present cases
20. Attend Cardiac Nuclear medicine read out when possible.

Educational Materials
These materials (or equivalent) should be read during the rotation:

36. UCSF DVDs #11 (Cardiac Imaging) and #7 (Congenital Heart Disease)
42. Urgent Findings on Portable Chest Radiography AJR 2011; 196:S45–S61

This rotation incorporates the core competencies as follows:

Medical knowledge – Goals 1-5
Interpersonal and Communication skills – Goals 5, 12
Problem Based Learning and Improvement – Goals 7, 13, 14
Professionalism – Goals 12
Patient Care – Goals 7-12
System Based Practice – Goals 15, 16

Chest Radiology Goals and Objectives
Submitted by: Dr. Thomson and Dr. Shah

Goals and Objectives for All Chest Rotations

1. Review all ER, inpatient and outpatient studies prior to review with faculty
2. Communicate significant radiologic findings as per ACR communications standard
3. Dictate all studies promptly after review is completed with faculty
4. Sign dictations at 8:00 am and 4:30 pm each duty day
5. Complete reading assignments with slack time during rotations
6. Keep a portfolio of interesting cases
7. Proctor medical students with faculty for 5001 program

7/30/2013
The above rotational goals and objectives incorporate the core competencies as follows:

Medical Knowledge — Goals 1, 2, 6, 7
Interpersonal and Communication Skills — Goals 1, 2, 3, 4, 5
Practice Based Learning and Improvement — Goal 2, 6, 7
Professionalism — Goals 1, 2, 3, 4, 5, 6, 7
Patient Care — Goals 2, 3, 4, 5

Resident assessment tools

- At the beginning of the rotation, the resident will be presented with the rotation objectives and expectations. The resident will have a mid rotation discussion of his/her performance so far during the rotation. At the end of the rotation, the faculty members of the section will meet and discuss the resident’s performance during the month. The chief of the section or assignee will review the evaluation with the resident near the last day of the rotation. In the unusual case of a substandard performance, this will be brought to the attention of the Residency Program Director and the resident for further counseling.

- Attendance at thoracic conferences and didactic courses.
- 360-degree evaluation process of resident, to include technologists, technical supervisor, and thoracic/body imaging fellows (if present).
- Feedback from medical students (if applicable) and patients/family.

Educational Materials and Requirements

1st year residents:
Felson’s “Principles of Chest Roentgenology” (Full Edition)
Reed's Chest Radiology: Plain Film Patterns and Differential Diagnoses, 5th ed

2nd year residents:
“Imaging Diseases of the Chest” by Armstrong, Wilson, Dee
Radiographics Article on HRCT:
http://radiographics.rsna.org/content/12/5/917.full.pdf
Review of high-resolution CT of the lung.
HL Corcoran, WR Renner, MJ Milstein - Radiographics, 1992 - radiographics.rsna.org
ACR Syllabus 1, 8

3rd year residents:
Webb's Thoracic Imaging: Pulmonary and Cardiovascular Radiology
ACR Syllabus 18, 27

4th year residents:
ACR Learning File on Chest
Chest Unknowns – Radiology Review University of Chicago DVD #27
UCSF DVD Reviews
ACR Syllabus 40 (V) 52 (VI)

General outline of Conditions and Pathology that will be reviewed (often in conferences/lectures organized by organ system)

- Normal anatomy and normal variants (including embryologic basis) of the thorax.
- Congenital diseases.
- Traumatic injuries.

7/30/2013
• Neoplasms and other masses.
• Infection and inflammation.
• Immunologic and autoimmune conditions.
• Metabolic diseases.
• Cardiovascular and ischemic conditions.
• Toxin, burn, irradiation and other environmental injuries or diseases.
• Iatrogenic injuries and post surgical change.
• Obstruction, perforation, leak, stricture, hernias and related pathology.
• Contrast reaction symptoms, etiology, management, premedication and reporting.
• Utilization, appropriateness criteria and protocol ordering (CT technique) for various clinical thoracic conditions.
• Radiation safety and risks.

ER Radiology Goals and Objectives
Submitted by: Dr. Thomson and Dr. Shah
Revised October 31, 2011

Hours – 7:30 am – last case dictated and reviewed.

Goals and Objectives for All Chest Rotations

• Review all ER, inpatient and outpatient studies prior to review with faculty
• Communicate significant radiologic findings as per ACR communications standard
• Dictate all studies promptly after review is completed with faculty
• Sign dictations at 8:00 am and 4:30 pm each day
• Complete reading assignments with slack time during rotations
• Keep a portfolio of interesting cases
• Proctor medical students with faculty for 5001 program

Educational Materials and Requirements

1st year residents:
• Atlas of Normal Roentgen Variants by Keats
• Radiology of Emergency Medicine by Harris & Harris
• Radiology of Aorta Cervical Spine Trauma by Harris

2nd year residents:
• Emergency Imaging by Brant & Zawad

3rd year residents:
• Emergency Imaging of Acutely Injured Child by Swischuck

4th year residents:
• ACR ER Syllabus #41
Special Instructions for Rotation:
- Arrival time and location on first day of rotation:

Evaluation Resident for Rotation:
- Residents are to ask their attending for verbal feedback at the midpoint of the rotation.
- Written evaluations of the resident will be completed by the faculty in One45.

Evaluation Faculty for Rotation:
- Written evaluations of the resident will be completed by the faculty in One45.

First Musculoskeletal Rotation:
After completing the first rotation in musculoskeletal radiology, the resident should be able to:
- Demonstrate learning of knowledge based objectives and mastery of technical objectives for the first rotation
- Communicate effectively with patients, referring clinicians, technologists and attendings
- Demonstrate appropriate judgment skills
- Obtain essential patient information pertinent to the radiologic examination
- Demonstrate a responsible work ethic
- Participate in quality improvement/quality assurance activities
- Participate in the education of students, interns, observers and residents from other departments

Intermediate Musculoskeletal Rotation:
After completing the intermediate level rotations in musculoskeletal radiology, the resident should be able to:
- Demonstrate learning of knowledge based objectives and mastery of technical objectives for the second and third rotations
- Continue to build and improve on skills developed during the first rotation
- Develop skills in protocoling and monitoring CT and routine MR examinations
- Demonstrate an understanding of the ACR Appropriateness Criteria and ACR Practice Guidelines and Technical Standards for musculoskeletal imaging
- Participate in the education of junior residents, interns, and medical students
- Observe and participate in image guided procedures

Advanced Musculoskeletal Rotation:
After completing the fourth four-week rotation in musculoskeletal radiology, the resident should be able to:
- Demonstrate learning of knowledge based objectives and mastery of technical objectives for the fourth rotation
- Continue to refine skills developed during the first three rotations
- Effectively use information technology to address clinical problems
- Participate in the education of junior residents and medical students
- Become a more independent provider of musculoskeletal radiologic interpretive services
- Manage clinical and technical questions from technical and support staff

Musculoskeletal Radiology Curriculum
Submitted by Dr. Melenevsky and Dr. Fields
Musculoskeletal Radiology Curriculum
Submitted by Dr. Melenevsky and Dr. Fields

(Adapted from Society of Skeletal Radiology guidelines by Donald Fleming et al.)

General competencies established by ACGME:
- patient care (PC)
- medical knowledge (MK)
- practice-based learning and improvement (PBL)
- interpersonal and communication skills (ICS)
- professionalism (P)
- systems-based practice (SBP)

Rotation 1

Goals
After completing the first four-week rotation in musculoskeletal radiology, the resident should be able to:
- Demonstrate learning of knowledge based objectives and mastery of technical objectives for the first rotation
- Generate accurate and concise radiographic reports in a timely manner
- Communicate effectively with patients, referring clinicians, technologists and supervisory staff
- Understand standard radiographic positioning and anatomy
- Obtain essential patient information pertinent to the radiologic examination
- Demonstrate knowledge of clinical indications for radiography and indications for urgent computed tomography (CT) and magnetic resonance (MR) examinations
- Demonstrate a responsible work ethic
- Participate in quality improvement/quality assurance activities
- Participate in the education of students and interns

Objectives

Knowledge based
- Demonstrate learning of normal radiographic and CT anatomy of the axial and appendicular skeleton
- Demonstrate learning of normal MRI anatomy of the knee
- Recognize and accurately describe common fractures and dislocations of the appendicular skeleton
- Recognize and describe fractures and malalignment of the cervical, thoracic and lumbar spine. Understand basic mechanisms of injury and distinguish stable from unstable injuries
- Demonstrate learning of pathophysiology and radiology of fracture healing and complications of healing such as delayed union, malunion and nonunion
- Demonstrate learning of radiographic presentation and evaluation of osteomyelitis and septic arthritis
- Recognize and describe complications of orthopedic devices including fracture fixation and spine and arthroplasty hardware

Technical
- Dictate clear, detailed, and accurate reports that include all pertinent information as established in the American College of Radiology (ACR) Guidelines for Communication (PBL, ICS)
- Use appropriate nomenclature when reporting radiographic, CT, MR or ultrasound (US) findings of musculoskeletal disease (ICS)
- Communicate all unexpected or significant findings to the ordering provider and document whom was called and the date and time of the discussion in the report (ICS, PC, P)
- Obtain relevant patient history from electronic records, dictated reports, the patient, or by communication with referring provider (PC)
- Recognize and describe positioning and anatomy of standard radiographic examinations of the musculoskeletal system (MK)
- Effectively provide feedback to radiology technologists regarding quality of exposure and patient positioning (ICS, SBP)
- Recognize when it is appropriate to obtain help from senior residents or faculty when assisting referring clinicians (PC, P)
- Demonstrate responsible, ethical behavior; positive work habits; and professional appearance; and adhere to principles of patient confidentiality (P)
- Participate in discussions with faculty and staff regarding operational challenges and potential system solutions regarding all aspects of radiologic services and patient care (SBP)

## Rotations 2 and 3

### Goals

After completing the intermediate level rotations in musculoskeletal radiology, the resident should be able to:

- Demonstrate learning of knowledge based objectives and mastery of technical objectives for the second and third rotations
- Continue to build and improve on skills developed during the first rotation
- Develop skills in protocoling and monitoring CT and routine MR examinations
- Demonstrate an understanding of the ACR Appropriateness Criteria and ACR Practice Guidelines and Technical Standards for musculoskeletal imaging
- Participate in the education of junior residents, interns, and medical students
- Observe and participate in image guided procedures

### Objectives

**Knowledge Based**

- Demonstrate learning of a systematic approach to arthritis.
- Demonstrate a systematic assessment of a solitary lesion of bone and be able to categorize the lesion as aggressive or nonaggressive. Develop an appropriate differential diagnosis based on patient age, lesion location, and lesion characteristics (margin, matrix, periosteal reaction, soft tissue extension). Demonstrate knowledge of systematic, safe and cost effective radiologic work-up of bone lesions including biopsy approach and compartmental anatomy.
- Recognize and describe common locations of and radiologic manifestations of osteonecrosis.
- Demonstrate knowledge of MRI safety issues including contraindication to scanning and use of contrast.
- Demonstrate learning of the use of various pulse sequences and planes of imaging used in MRI of musculoskeletal disorders
- Demonstrate learning of common knee and shoulder pathology on MRI (meniscal tear, tendon and ligament injury, fracture, chondral disease, rotator cuff tear, and labral pathology)
- Demonstrate learning of the normal MRI anatomy of the shoulder, hip and ankle

**Technical**

- Build and improve on skills acquired during first rotation
- Demonstrate the ability to gather essential and accurate patient information (electronic, personal communication) to appropriately prescribe urgent MRI protocols (PC, ICS)
- Provide effective and timely feedback and education to CT and MRI technologists regarding quality of examinations (ICS, SBP)
o Demonstrate ability to monitor CT and routine MRI examinations to ensure the patient is adequately evaluated (MK, PC)
o Demonstrate an understanding of indications, contraindications, needle path, risks and post procedural management of CT and US guided procedures including management of complications (MK, PC)
o Provide technical and educational guidance to junior residents and students (ICS)
o Observe and safely perform fluoroscopically guided joint injections with faculty supervision (PC)
o Demonstrate an understanding of indications, contraindications, radiation risks, and post procedural management of fluoroscopically guided procedures including management of complications (MK, PC)
o Demonstrate an ability to counsel a patient and obtain informed consent before performing a procedure, including a description of the procedure, risks, benefits, and alternatives; and solicit and respond to patient questions without discrimination based on religious, ethnic, sexual, economic, or educational differences (ICS, PC, P)
o Maintain a log of all procedures performed including complications (PBL)

### Rotation 4

**Goals**

After completing the fourth four-week rotation in musculoskeletal radiology, the resident should be able to:

- Demonstrate learning of knowledge based objectives and mastery of technical objectives for the fourth rotation
- Continue to refine skills developed during the first three rotations
- Effectively use information technology to address clinical problems
- Participate in the education of junior residents and medical students
- Become a more independent provider of musculoskeletal radiologic interpretive services
- Manage clinical and technical questions from technical and support staff

**Objectives**

- **Knowledge based**
  - Recognize radiologic findings and describe pathophysiology of skeletal manifestations of systemic diseases including metabolic and hematologic disorders
  - Demonstrate learning of common pathology of the hip and ankle on MRI
  - Demonstrate learning of anatomy and common injuries/pathology of the foot, elbow and wrist on MRI
  - Demonstrate systematic approach to soft tissue masses and bone tumors on MRI
  - Demonstrate learning of appearance, differential diagnosis, staging and management of bone and soft tissue tumors utilizing multimodality approach
  - Demonstrate understanding of common indications for musculoskeletal ultrasound and normal sonographic anatomy.

- **Technical**
  - Improve and build on skills acquired during the first three rotations
  - Observe, participate and interpret musculoskeletal sonographic studies (MK, PC)
  - Demonstrate the ability to locate, appraise and assimilate evidence from scientific studies related to the performance and interpretation of musculoskeletal imaging (PBL)
  - Demonstrate the ability to teach a junior colleague how to protocol examinations and plan procedures (PC, ICS)
  - Demonstrate the ability to answer common procedural and policy questions from technologists and support staff (PC, ICS)
Reading list:

4. MRI of the Musculoskeletal System, Clyde Helms MD
5. Musculoskeletal Imaging: The Requisites, B. J. Manaster M.D
6. Arthrography: Principles and Practice in Radiology, Julia Crim

In addition to required reading list, residents are encouraged to reference:
- Magnetic Resonance Imaging in Orthopaedics and Sports Medicine, by David W. Stoller, M.D
- Diagnostic and Surgical Imaging Anatomy: Musculoskeletal by B. J. Manaster MD
- Fundamentals of Musculoskeletal Ultrasound (Fundamentals of Radiology) Jon A. Jacobson MD

Case-based learning:
- Musculoskeletal Imaging: A Teaching File (LWW Teaching File Series) Felix S. Chew, Catherine C. Roberts
- Musculoskeletal Imaging: Case Review Series Joseph Yu
- ACR teaching file

Neuroradiology Goals and Objectives
Submitted by: Dr. Figueroa

Special Instructions for Rotation:
- Arrival time and location on first day of rotation:

Evaluation Resident for Rotation:
- Residents are to ask their attending for verbal feedback at the midpoint of the rotation.
- Written evaluations of the resident will be completed by the faculty in One45.

Evaluation Faculty for Rotation:
- Written evaluations of the resident will be completed by the faculty in One45.

First Neuroradiology Rotation:
After completing the first rotation in Neuroradiology radiology, the resident should be able to:
- Demonstrate learning of knowledge based objectives and mastery of technical objectives for the first rotation
- Communicate effectively with patients, referring clinicians, technologists and attendings
- Demonstrate appropriate judgment skills
- Obtain essential patient information pertinent to the radiologic examination
- Demonstrate a responsible work ethic
- Participate in quality improvement/quality assurance activities
- Participate in the education of students, interns, observers and residents from other departments

Intermediate Neuroradiology Rotation:
After completing the intermediate level rotations in Neuroradiology radiology, the resident should be able to:
- Demonstrate learning of knowledge based objectives and mastery of technical objectives for the second and third rotations
- Continue to build and improve on skills developed during the first rotation
- Develop skills in protociling and monitoring CT and routine MR examinations
- Demonstrate an understanding of the ACR Appropriateness Criteria and ACR Practice Guidelines and Technical Standards for Neuroradiology imaging
- Participate in the education of junior residents, interns, and medical students
- Observe and participate in image guided procedures

Advanced Neuroradiology Rotation:

7/30/2013
After completing the fourth four-week rotation in Neuroradiology radiology, the resident should be able to:

- Demonstrate learning of knowledge based objectives and mastery of technical objectives for the fourth rotation
- Continue to refine skills developed during the first three rotations
- Effectively use information technology to address clinical problems
- Participate in the education of junior residents and medical students
- Become a more independent provider of Neuroradiology radiologic interpretive services
- Manage clinical and technical questions from technical and support staff

Neuroradiology Goals and Objectives
Submitted by: Dr. Figueroa

Global Training Goals:
Residents rotate through the Neuroradiology Service for a minimum of four consecutive weeks during each of their four years of training. It is expected that residents will progressively develop their abilities to perform and interpret imaging studies of the central nervous system. Residents will be taught the practical clinical skills necessary to interpret all neuroradiologic studies, including plain radiographs, computed tomography (CT) scans and magnetic resonance (MR) imaging examinations of brain and skull, head and neck, spinal cord and vertebral column. They will be instructed in the performance and interpretation of invasive spinal procedures including fluoroscopy-guided spinal canal puncture/myelography and image-guided biopsies of the spine and skull base. They will be introduced to basic skills and interpretation of cerebral angiography as their skill set and knowledge base matures, typically by their senior PGY-5 rotation.

The residents will be introduced to the science that underlies clinical neuroradiology, in particular neuroanatomy and neuropathology. They will learn to apply the physical principles of plain radiography, multidetector CT, MRI, fluoroscopic invasive procedures and digital angiography. They will learn the relative value of each modality, enabling them to choose the appropriate study and the appropriate protocol for each patient.

The residents will manage their assigned work area, take responsibility for prescribing protocols, supervise studies, learn to dictate concise and appropriate reports on the daily cases and learn to serve as consultants to referring physicians.

It is expected that residents will participate in the performance of the full range of examinations done by the service in proportion to their growing radiologic skills. They will obtain consents and supervise or perform intravenous injections of contrast, learn the indications and contraindications for contrast administration and learn to recognize and treat adverse reactions. Residents will protocol and monitor all CT and MR exams after they have demonstrated a sufficient level of knowledge and experience to perform these tasks. Residents will aid in the performance of invasive procedures including spinal taps, myelograms, angiograms and other invasive procedures such as image-guided vertebral and skull base biopsies. They will learn to explain these procedures to patients and their families, obtain pre-procedure consent and write pre- and post-procedure orders. They will learn techniques of arterial puncture, catheter choice and manipulation, and contrast dosage. They will learn to recognize and treat complications of these invasive procedures. Residents will be responsible for appropriate follow-up and examination of patients prior to discharge.

The residents will be excused from rotation duties to participate in residency program approved didactic activities, but must return promptly to the Neuroradiology reading room or other Neuroradiology attending-designated work area within 15 minutes after completion of the didactic activity. The residents may leave the assigned area when their assigned Neuroradiology daily work is completed.

7/30/2013
Rotation Specific Knowledge-Based Objectives

At the end of the rotation the resident should be able to:

1. Demonstrate knowledge of the appearance of major intracranial structures as visualized on axial CT and MR scans, be able to identify all major structures and components of the brain, ventricles and subarachnoid (cisterns) spaces in axial, coronal and sagittal projections.
2. Demonstrate knowledge of the anatomy of the calvarium, skull base and soft tissues/ fascial spaces of the neck as displayed on plain X rays and neck CT.
3. Demonstrate knowledge of the normal appearance of the spine on plain radiographs and CT scans, be able to assess spinal alignment and be able to identify all osseous components of the spinal column by the end of first rotation.
4. Identify the large vessels of the cervical and intracranial regions (carotid, vertebral and basilar arteries, jugular veins and dural venous sinuses) on routine CT and MR studies of the head and neck.
5. Demonstrate knowledge of the basic pathology and pathophysiology of diseases of the brain, spine, and head and neck, with particular emphasis on the common traumatic, ischemic and inflammatory conditions of the brain, skull base, neck and spine.
6. Become familiar with CT imaging parameters, including window and level settings, slice thickness, inter-slice gap, and helical imaging parameters, and image reconstruction algorithms (e.g., soft tissue and bone). Learn the typical CT density of commonly occurring processes such as edema, air, calcium, blood and fat.
7. Demonstrate knowledge of basic physical principles of MRI. Be able to identify commonly used pulse sequences and become familiar with standard MR protocols. Learn the intensity of normal tissues on routine pulse sequences.
8. Demonstrate skills in the interpretation of CT scans with a particular emphasis on studies performed on individuals presenting with acute or emergent clinical abnormalities (infarction, spontaneous intracranial hemorrhage, aneurysmal subarachnoid hemorrhage, traumatic brain injury, infections, hydrocephalus, and brain herniation syndromes).
9. Demonstrate ability to identify common acute emergent lesions of head and neck: be familiar with the plain film and CT appearance of traumatic (fractures and soft tissue injuries) and inflammatory (sinusitis, orbital cellulitis, otitis, mastoiditis, cervical adenitis and abscess) lesions of the orbit, skull base, face and petrous bones. Learn to identify airway compromise and obstruction.
10. Demonstrate skill in recognizing the appearance of traumatic lesions on plain radiographs with emphasis on recognizing findings associated to spinal instability. Become familiar with the CT and MRI findings of spinal degenerative diseases.
11. Demonstrate skill in recognizing the normal appearance of the pediatric brain (e.g., myelination), spine (e.g., ossification) and head and neck (e.g., sinus development) encountered in the newborn, infant, and child. Be able to identify the features of hydrocephalus on CT and MR.

Technical and Non-interpretive Objectives, First Rotation:

At the end of the rotation, the resident should be able to:

12. Learn the appropriate format for dictation of reports of neuroradiologic imaging studies; pre-dictate, participate in case discussions and dictate as many cases as possible.
13. Prescribe appropriate imaging protocols for requested examinations based upon clinical information available from ordering physician and/or electronic medical record. Be able to modify imaging protocols based on identification of unexpected or novel findings.
14. Attend all lectures and conferences.
15. Learn to obtain informed consent, by explaining the risks and benefits of contrast-enhanced CT/MR to the patient.
16. Learn appropriate techniques for injection of contrast (including use of power injectors).
17. Learn to recognize and treat contrast reactions.

Decision making/ Value judgment skills, First Rotation

At the end of the rotation, the resident should be able to:

18. Recognize limitations in knowledge and skills for making competent decisions.
19. Provide provisional interpretations and consultations of plain radiographs, CT scans and MR scans performed for the Emergency Department.
20. Provide consultations for house staff and referring physicians on imaging studies after reviewing the exam with an attending neuroradiologist.

**Educational Materials and Reading Assignments: First Rotation (PGY 2)**


**The above rotation 1 goals incorporate the core competencies as follows:**
- Medical Knowledge — Goals 1-23
- Interpersonal and Communication Skills — Goals 12-15, 19, 20
- Based Learning and Improvement — Goals 12-20
- Professionalism — Goals 12-15, 18- 20
- Patient Care — Goals 15-20

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**Second Neuroradiology Rotation (PGY 3):**

**Knowledge Based Objectives, Second Rotation (PGY 3):**
At the end of the rotation, the resident should be able to:

1. Confidently interpret neuroradiology imaging studies, including MDCT and MRI of brain, head and neck, spine and vascular anatomy pertinent to neuroimaging, and be able to correlate with other imaging modalities.
2. Demonstrate detailed knowledge of intracranial anatomy as displayed on multi-planar CT and MRI images.
3. Demonstrate detailed knowledge of the complex anatomy of the orbit, petrous bone, skull base and soft tissues of the neck as displayed on CT and MR in multiple planes. Resident must become proficient in evaluation of suprahial and infrahyoid neck spaces.
4. Demonstrate detailed knowledge of the normal spinal osseous structures, intervertebral discs, support ligaments and the contents of the thecal sac (spinal cord and nerve roots) on CT, MR, and myelography.
5. Demonstrate detailed knowledge of the large vessels of the cervical and intracranial regions (carotid, vertebral and basilar arteries, jugular veins and dural venous sinuses) and their key branches on MR and CT angiography.
6. Demonstrate detailed knowledge of the basic pathology and pathophysiology of diseases of the brain, spine, and head and neck. Learn the pathophysiology of rapidly evolving processes, in particular cerebral infarction and inflammation.
7. Demonstrate proficiency in the application of appropriate CT imaging protocols for assessment of the full range of lesions encountered in Neuroradiology. Learn the principles and utility of multi-planar reconstruction and CT angiography. Learn to process and analyze CT-Perfusion studies.
8. Demonstrate detailed knowledge of the clinical utility of each MRI routine pulse sequence. Learn how to combine pulse sequences to produce effective and efficient imaging protocols for common disease processes.
10. Become familiar with more advanced imaging techniques such as MR angiography, fat suppression techniques and diffusion/perfusion MR sequences.

7/30/2013
11. Demonstrate detailed knowledge of the CT and MR findings of hyperacute infarction (including findings on diffusion weighted MRI and CT-Perfusion).
12. Demonstrate ability to identify and characterize focal lesions and diffuse processes and be able to provide a short differential diagnosis for the potential causes of these processes.
13. Demonstrate detailed knowledge of the appearance of traumatic lesions by CT. Be able to characterize fractures based on clinical classification systems (e.g., Le Fort fractures).
14. Demonstrate detailed knowledge of the neoplastic masses arising in the orbit, skull base, petrous bone and soft tissues of the neck. Be able to use anatomic classification schemes to accurately describe the location of mass lesions.
15. Demonstrate detailed knowledge of the CT, MRI and myelographic findings of spinal cord compression. Become familiar with findings on all three modalities that allow for accurate spatial localization of spinal lesions (extra-dural, infra-dural, extra-medullary, and intra-medullary).
16. Demonstrate ability to identify and differentiate discogenic and arthritic degenerative diseases.
17. Demonstrate ability to identify and characterize traumatic lesions (e.g., stable vs. unstable, mechanisms of injury) using routine and reformatted CT scans.
18. Demonstrate detailed knowledge of the indications, limitations, risks and benefits for each technique used for visualization of vascular anatomy and pathology.
19. Demonstrate detailed knowledge of the imaging appearance of aneurysms, vascular malformations, occlusive diseases and vascular tumors.
20. Demonstrate detailed knowledge of CNS congenital lesions and malformations. Be able to detect disorders of the perinatal period on ultrasound, CT, and MR.

Technical and Non-interpretive Objectives, Second Rotation:
21. At the end of the rotation, the resident should be able to obtain informed consent for invasive procedures including angiography, spinal punctures/myelography and image-guided biopsies, and be able to explain the risks, benefits and complications of these procedures to patients and their families.
22. Residents are responsible for appropriate follow-up of patients after performing procedures, including assessing for complications, appropriateness of discharge, handling of specimens, and tracking the results of fluid/tissue samples/biopsies.
23. At the end of the rotation, the resident should be able to perform basic spine interventions, under close supervision by neuroradiology attending and/or fellow.

Decision making/Value judgment skills, Second Rotation
At the end of the rotation, the resident should be able to:
24. Confidently interpret routine neuro CT and neuro NRI studies, showing familiarity with all imaging protocols.
25. The resident should be familiar with all aspect of Neuroradiology in preparation for ABR examination.
26. Supervise daily clinical work with minimal supervision by the faculty.

Educational Materials and Reading Assignments: Second Rotation

The above Rotation 2 goals incorporate the core competencies as follows:
Medical Knowledge — Goals 1-29
Interpersonal and Communication Skills — Goals 21, 22
Practice Based Learning and Improvement — Goals 12-20
Professionalism — Goals 21-29
Patient Care — Goals 1-24

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Knowledge Based Objectives, Third Rotation (PGY 4):
At the end of the rotation, the resident should be able to:

1. Confidently interpret neuroradiology imaging studies, including MDCT and MRI of brain, head and neck, spine and vascular anatomy pertinent to neuroimaging, and be able to correlate with other imaging modalities.
2. Demonstrate workstation skills in the process and analysis of CT-Perfusion studies, principles of multi-planar reconstruction and CT angiography.
3. Demonstrate basic knowledge of advanced imaging techniques such as MR Spectroscopy, fMRI activation studies, Diffusion weighted sequences and Diffusion tensor imaging sequences.
4. Demonstrate lesion recognition and appropriate differential diagnosis based on specific anatomic locations: skull base, sella, cortical, subcortical, parenchymal, sub ependymal and ventricular lesion locations.
5. Demonstrate proficiency in lesion localization by neck spaces, applying appropriate classification schemes for location and differential diagnosis of neck congenital, inflammatory and neoplastic mass lesions.
6. Demonstrate ability to recognize and localize spinal lesions in correct spinal compartments: extra-dural, intra-dural, extra-medullary, and intra-medullary.
7. Be able to identify and differentiate discogenic and arthritic degenerative diseases.
8. Demonstrate ability to identify and characterize traumatic lesions (e.g., stable vs. unstable, mechanism of injury) using routine and reformatted CT scans.
9. Demonstrate ability to recognize the angiographic features of extra- and intracranial atherosclerosis utilizing catheter angiography, MRA and sonography.
10. Demonstrate knowledge and correct application of the indications, limitations, risks and benefits for each technique used for visualization of vascular anatomy and pathology.
11. Demonstrate knowledge and correct application of the angiographic appearance of aneurysms, vascular malformations, occlusive diseases and neoplasms.

Technical and Non-interpretive Objectives, Third Rotation:
At the end of the rotation, the resident should be able to:

12. Supervise daily clinical work with minimal supervision by the faculty.
13. Demonstrate ability to obtain informed consent for invasive procedures including angiography, spinal punctures/myelography and image-guided biopsies. Be able to explain the risks, benefits and complications of these procedures to patients and their families.
14. Participate in the performance of diagnostic angiograms of the cervical and cranial vessels. Learn the basic techniques of arterial puncture and catheter manipulation. Assist senior residents, fellows, and attending neuroradiologists in the performance of angiograms.
15. Demonstrate knowledge of the technical aspects and perform fluoroscopically guided punctures of the lumbar spinal canal for the purpose of spinal fluid collection, myelography and intrathecal injection of medications. Be able to perform myelography under the supervision of an attending radiologist. Residents are responsible for appropriate follow-up of patients after performing procedures, including assessing for complications, appropriateness of discharge, handling of specimens, and tracking the results of fluid/tissue samples/biopsies.

Decision making/Value judgment Skills
At the end of the rotation, the resident should be able to:

16. Conduct almost independently all aspects of Neuroradiology imaging practice to include management of CT and MRI caseloads, priority assignment of add-on cases based on clinical urgency and merit, and consultation with the referring physicians on the results of the studies.
17. Modify imaging protocols based on identification of unexpected or novel findings.

Educational Materials and Reading Assignments: Third Rotation

7/30/2013
Fourth Neuroradiology Rotation (PGY 5)

Knowledge Based Objectives:
At the end of the rotation, the resident should be able to:

1. Demonstrate a detailed knowledge of anatomy, able to identify subdivisions and fine anatomic details of the brain, the ventricles, subarachnoid space, vascular structures, sella turcica, and cranial nerves; be able to identify all important extra- and intra-crani-al arteries (secondary and tertiary branches of the carotid and basilar arteries) and veins (cortical and deep cerebral veins) on all imaging modalities.
2. Demonstrate knowledge of the principles and utility of multi-planar reconstruction, surface rendering techniques and advanced CT angiography of neck and intracranial vessels.
3. Demonstrate knowledge and practical utilization of imaging protocols for complex clinical cases, showing familiarity with more advanced imaging techniques such as MR angiography, fat suppression, diffusion/perfusion, diffusion tensor imaging, functional MRI activation studies and MR spectroscopy.
4. Demonstrate appropriate image interpretation skills to differentiate different types of focal intracranial lesions (neoplastic, inflammatory, vascular) based on anatomic location (e.g., intra- vs. extra-axial), contour, intensity and enhancement pattern.
5. Demonstrate appropriate image interpretation skills to differentiate diffuse intracranial abnormalities (e.g., hydrocephalus and atrophy) and treatment-related findings (e.g., post-surgical and post-radiation).
6. Demonstrate appropriate image interpretation skills to identify patterns of disease spread within and between areas of the head and neck (e.g., perineural and nodal spread).
7. Demonstrate appropriate image interpretation skills to differentiate spinal inflammatory and neoplastic lesions.
8. Demonstrate knowledge of the imaging features of intraspinal processes, including syringomyelia, arachnoiditis and spinal dysraphism, post-surgical and other treatment-related findings.
9. Demonstrate appropriate knowledge to identify and differentiate acquired lesions (traumatic, ischemic, inflammatory and neoplastic) of the newborn, infant, child, and adolescent.

Technical and Non-interpretive Objectives, Fourth Rotation:
At the end of the rotation, the resident should be able to:

10. Evaluate the clinical status of patients prior to, during and after neuroradiology procedures; learn to recognize complications of these procedures and to initiate appropriate treatment.
11. Be able to perform image-guided biopsies of the spine and skull base under the supervision of an attending radiologist. Residents are responsible for appropriate follow-up of patients after performing procedures, including assessing for complications, appropriateness of discharge, handling of specimens, and tracking the results of fluid/tissue samples/biopsies.

Decision making/Value judgment skills, Fourth Rotation:
At the end of the rotation, the resident should be able to:

12. Direct the choice of imaging modality and protocol all neuroradiologic studies.
13. Act as a consultant to junior radiology residents.
14. Learn to identify those cases that require the additional expertise in assessment of imaging studies.
15. Assume a leadership role and be able to apply your full diagnostic skills to the daily neuroradiologic case load work up. Attempt to perform at the level of an independent practitioner, with attending the neuroradiologist acting as your consultant.

**Educational Materials and Reading Assignments: Fourth Rotation**

23. ACR Neuroradiology Second Series and Third Series Sillabi
24. ACR Head and Neck Sillabi

The above rotation 4 goals incorporate the core competencies as follows:
- Medical Knowledge — Goals 1-24
- Interpersonal and Communication Skills — Goals 12-15, 19, 20
- Practice Based Learning and Improvement — Goals 10-15
- Professionalism — Goals 1-15
- Patient Care — Goals 10, 11

### Nuclear Medicine Goals and Objectives

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<td>Submitted by: Drs. Pucar, Williams, Sostre and McCue</td>
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#### Goals and Objectives

**Special Instructions for Rotation:**
- Arrival time and location on first day of rotation: NM reading room at 7:30.

**Evaluation Resident for Rotation:**
- Residents are to ask their attending for verbal feedback at the midpoint of the rotation.
- Written evaluations of the resident will be completed by the faculty in One45.

**Evaluation Faculty for Rotation:**
- Written evaluations of the resident will be completed by the faculty in One45.
- For intermediate and advanced rotations only, the resident will determine the number of cardiac and PET cases that he/she has dictated and the data will be reported in One45 as a part of Faculty Evaluation.

**First Nuclear Medicine Rotation:**

After completing the first rotation in Nuclear Medicine radiology, the resident should be able to:
- Demonstrate learning of knowledge based objectives and mastery of technical objectives for the first rotation of basic concepts of nuclear tracers and imaging and nuclear medicine physics and be able to interpret routine nuclear medicine procedures including planar imaging, SPECT/CT and correlative anatomic imaging.
- Demonstrate knowledge and participate in morning Quality Assurance (QA)/ Quality Control (QC) testing of radiopharmaceuticals and NM equipment.
- Participate in outpatient and inpatient therapies: obtain history and physicals and informed consent, assist /supervise therapy. Participate and acquire skills in performing lymphoscintigraphy.
- Communicate effectively with patients, referring clinicians, technologists and attendings.
• Demonstrate appropriate judgment skills. Particularly in deciding on disposition and completion of NM studies, including the need for additional dynamic imaging, spot images and SPECT/CT, through interaction with NM technologists and physicians.
• Demonstrate a responsible work ethic
• If the time allows, participate in the education of students, interns, observers and residents from other departments.

Intermediate Nuclear Medicine Rotation:
After completing the intermediate level rotations in Nuclear Medicine radiology, the resident should be able to:
• Demonstrate learning of knowledge based objectives and mastery of technical objectives for the second and third rotations.
• Continue to build and improve on skills developed during the first rotation and acquire the knowledge and interpretation skills in cardiac imaging (myocardial perfusion imaging after exercise or pharmacologic stress test, MUGA, viability imaging) and PET/CT studies. After a completion of intermediate rotation the resident should be familiar with all procedures performed in nuclear medicine.
• Acquire knowledge regarding regulations of nuclear imaging by the Nuclear Regulatory Commission (NRC), State, and Hospital (Joint Commission on Accreditation of Health Care Organizations (JCAHO)).
• Participate in tumor boards pertinent to nuclear medicine. Acquire knowledge in staging and assessing treatment response of common cancers.
• Demonstrate an understanding of the ACR Appropriateness Criteria and ACR Practice Guidelines and Technical Standards for Nuclear Medicine imaging.
• Participate in the education of junior residents, interns, and medical students.
• Demonstrate academic skills by performing one of the following: Submit Case in the Point to ACR or submit a case report for a publication in the journal.

Advanced Nuclear Medicine Rotation:
After completing the fourth four-week rotation in Nuclear Medicine radiology, the resident should be able to:
• Demonstrate learning of knowledge based objectives and mastery of technical objectives for the fourth rotation.
• Continue to refine skills developed during the first three rotations.
• Effectively use information technology to address clinical problems.
• Participate in Tumor Boards.
• Participate in the education of junior residents and medical students.
• Become a more independent provider of Nuclear Medicine radiologic interpretive services.
• Manage clinical and technical questions from technical and support staff.
• Submit Case in the Point to ACR or submit a case report for a publication in the journal.

Nuclear Medicine
Submitted by: Drs. Pucar, Williams, Sostre and McCue

Rotation 1: Nuclear Medicine

Knowledge Based Objectives: At the end of the rotation, the resident should be able to:
1. Comprehend basic concepts of nuclear tracers and imaging and nuclear medicine physics.
2. Comprehend and be able to interpret routine procedures, such as bone, lung, endocrine, (thyroid and parathyroid), renal, infection and inflammation imaging (gallium, WBC), and tumor imaging (MIBG, Octreotide, ProstaScint).
3. Complete first reading of “Essentials of Nuclear Medicine Imaging” (Mettler, Guiberteau) and powerpoint lectures and other electronic material in the “Resident files.”
4. Participate in daily clinical work with a degree of independence as determined by faculty, with the goal by the end of rotation to be able to decide on disposition and completion of NM studies, including the need for additional dynamic imaging, spot images and SPECT/CT. In this regard, it is essential for
resident to be available to interact with NM technologists and physicians when the decisions on completion of NM studies are made.
5. Correlate nuclear medicine studies with other imaging modalities.
6. Participate in outpatient and inpatient therapies: obtain history and physicals, informed consent, assisting/supervising therapy. Participate and acquire skills in performing lymphoscintigraphy.

**Technical Skills:** At the end of the rotation, the resident should be able to:
7. Participate in morning pharmaceutical Quality Assurance/Quality Control (QA/QC) testing.
8. Attend lectures/conferences.
9. Review equipment and QA/QC with assigned technologist once/week or as required.
10. Predictate, participate in case check-outs and dictate as many cases as possible.

**Decision-Making and Value Judgment Skills:** At the end of the rotation, the resident should be able to:
11. Recognize limitations in knowledge and skills for making competent decisions.

### Rotation 2: Nuclear Medicine

**Knowledge Based Objectives:** At the end of the rotation, the resident should be able to:
13. Confidently interpret NM procedures including SPECT CT and correlate with other imaging modalities. Comprehend novel and advanced SPECT/CT applications such as Datscan for movement disorders, brain perfusion and epilepsy imaging, whole body bone SPECT/CT, post-thyroid cancer radioactive iodine treatment SPECT/CT. Comprehend a role of tumor imaging (MIBG, Octreotide, ProstaScint, iodine), in correlation with other imaging modalities, in oncologic management.
14. Confidently conduct out patient and inpatient therapies: obtain history and physicals, informed consent, and conduct therapy under supervision.
15. Comprehend myocardial imaging principles and imaging procedures (myocardial perfusion imaging after exercise or pharmacologic stress test, MUGA, viability imaging).
16. Comprehend positron emission tomography (PET) imaging principles and imaging procedures. Comprehend a role of PET/CT in oncologic management and participate in tumor board pertinent to NM.
17. Participate/supervise daily clinical work with a degree of independence as determined by faculty.
18. Complete faculty assigned reading list.

**Technical Skills:** At the end of the rotation, the resident should be able to:
19. Participate in morning pharmaceutical QA/QC testing.
20. Attend lectures/conferences, expand concepts, applications, and comparisons with other diagnostic methods.
21. Comprehend QA/QC procedures, camera performance, and specific imaging techniques including SPECT acquisition and processing procedures.
22. Review equipment and QA/QC with assigned technologist once/week or as required.
23. Participate in case check-outs and dictate most cases.

**Decision-Making and Value Judgment Skills:** At the end of the rotation, the resident should be able to:
24. Recognize knowledge and skills for making competent decisions.
Rotation 3: Nuclear Medicine

Knowledge Based Objectives: At the end of the rotation, the resident should be able to:
25. Confidently interpret standard NM procedures including SPECT/CT, PET/CT (oncology, cardiac and neurology applications, including novel tracers such F-18 Florbetapir for dementia), cardiac imaging and conduct outpatient and inpatient therapies. The resident should be familiar with all aspect of NM in preparation for ABR examination. Prepare for ABR examination.
26. Supervise daily clinical work with minimal supervision by the faculty.
27. Participate in tumor boards pertinent to NM.
28. Acquire knowledge regarding regulations of nuclear imaging by the NRC, State, and Hospital (JCAHO).
29. Competently recommend appropriate radiologic workup for clinical presentations.
30. Complete faculty assigned reading list.

Technical Skills: At the end of the rotation, the resident should be able to:
31. Participate in morning pharmaceutical QA/QC testing.
32. Attend nuclear cardiology lectures/conferences.
33. Attend lectures/conferences, expand concepts, applications, and comparisons with other diagnostic methods.
34. Review equipment and QA/QC with assigned technologist once/week or as required.
35. Participate in case check-outs and dictate most cases.
36. Teach/instruct junior residents and medical students.
37. Review teaching files.

Decision-Making and Value Judgment Skills: At the end of the rotation, the resident should be able to:
38. Recognize knowledge and skills for making competent decisions.

Rotation 4: Nuclear Medicine

Knowledge Based Objectives: At the end of the rotation, the resident should be able to:
40. Conduct almost independently all aspects of NM practice and consult the referring physicians on the results of the studies and at the tumor boards. Prepare for the transition to the independent practice.
41. Complete faculty assigned reading list.

Technical Skills: At the end of the rotation, the resident should be able to:
42. Participate in morning pharmaceutical QA/QC testing.
43. Attend lectures/conferences, expand concepts, applications, and comparisons with other diagnostic methods.
46. Review equipment and QA/QC with assigned technologist once/week or as required.
47. Participate in case check-outs and proficiently dictate cases.
48. Teach/instruct junior residents and medical students.

Decision-Making and Value Judgment Skills: At the end of the rotation, the resident should be able to make competent decisions on all aspects of NM practice.

The above rotational goals incorporate the core competencies as follows:
Medical Knowledge — Goals 1-51

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Practice Based Learning and Improvement — Goals 3, 4, 7, 10-15, 17, 18, 22, 23, 27, 29, 30, 32, 33, 36, 38-40, 42, 45, 48, 51
Professionalism — Goals 2, 4, 5, 7, 10, 12-14, 17-19, 22, 23, 26-29, 32, 33, 36, 37, 39-42, 45, 48-51
Patient Care — Goals 4, 5, 10, 12, 13, 14, 18, 22, 26-29, 32-33, 36, 40-42, 48, 51

Resident Assessment Tools

• At the beginning of the rotation, the resident will be presented with the rotation objectives and expectations. The resident will have a mid rotation discussion of his/her performance so far during the rotation. At the end of the rotation, the faculty members of the section will meet and discuss the resident’s performance during the month. The chief of the section or assignee will review the evaluation with the resident near the last day of the rotation. In the unusual case of a substandard performance, this will be brought to the attention of the Residency Program Director and the resident for further counseling.
• Attendance at nuclear medicine and nuclear cardiology conferences and didactic courses.
• In-service examination results.
• 360-degree evaluation process of resident, to include technologists, technical supervisor, and nuclear medicine fellows (if present) and patients/family.
• Feedback from medical students (if applicable).
• For intermediate and advanced rotations, resident is expected to read 6 cardiac and 10 PET/CT cases per week.

General outline of types of conditions and pathologic entities that will be reviewed (often in conferences/lectures organized by organ system) includes:
• Normal anatomy and normal or pathological variants (including embryologic basis) that may simulate disease processes in the nuclear medicine patient.
• Congenital, acquired and functional disease states evaluated by nuclear medicine.
• Traumatic or post-traumatic injuries that require nuclear medicine evaluation.
• Neoplasms and other masses.
• Pulmonary embolic disease and other respiratory disorders.
• GI, GU, biliary and other motility disorders.
• Detection of infection and inflammation.
• Metabolic diseases.
• Detection of acute and chronic bleeding disorders.
• Hematology, oncology, neurology, and related applications of SPECT and/or PET/CT imaging.
• Cardiovascular and related ischemic conditions.
• Utilization, appropriateness criteria, patient preparation and protocol ordering for various clinical conditions.

Education Materials for Nuclear Medicine

LECTURES: The lectures are not intended to be a substitute for a thorough reading and comprehension of appropriate texts and lecture notes. Repetition of simple facts and characteristics contained in standard references is not the best use of lecture time. Rather lectures expand on concepts, applications, and comparisons with other diagnostic methods. A generous use of examples that demonstrate strengths and limitations of the procedures is encouraged, as well as a review of specific radiopharmaceuticals in each area.

Rotation 1

Electronic material under “Resident Files”
“Nuclear Medicine Physics: The Basics” (Chandra)
“Fundamentals of Diagnostic Radiology” (Brandt, Helms).
“Essentials of Nuclear Medicine Imaging” (Mettler, Guiberteau)
Electronic material under “Resident Files”
“Essentials of Nuclear Medicine Imaging” (Mettler, Guiberteau)
“PET and PET/CT: A Clinical Guide” (Lin, Alavi)
Oncologic Imaging: A Multidisciplinary Approach by Paul Silverman
Oncologic Imaging: Essentials of Reporting Common Cancer by Hedvig Hricak
AJCC staging manual 7th edition
NCCN guidelines, available under www.nccn.org
“Nuclear Medicine: The Requisites” (Ziessman, O’Malley, Thrall)
“Nuclear Medicine Imaging: A Teaching File” (LWW Teaching File Series) (Habibian, Delbeke, Martin, Sandler)
American College of Radiology (ACR) CD

Electronic material under “Resident Files”
“Essentials of Nuclear Medicine Imaging” (Mettler, Guiberteau)
“PET and PET/CT: A Clinical Guide” (Lin, Alavi)
Oncologic Imaging: A Multidisciplinary Approach by Paul Silverman
Oncologic Imaging: Essentials of Reporting Common Cancer by Hedvig Hricak
AJCC staging manual 7th edition
NCCN guidelines, available under www.nccn.org
“Nuclear Medicine: The Requisites” (Ziessman, O’Malley, Thrall)
“Nuclear Medicine Imaging: A Teaching File” (LWW Teaching File Series) (Habibian, Delbeke, Martin, Sandler)
ACR Syllabi: - Nuclear Medicine II, III, IV, & V
“PET and PET/CT in Oncology” (Oehr, Biersack, Coleman)
Auntminnie.com - Scott Williams, MD, Nuclear Medicine Textbook
http://www.auntminnie.com/index.asp?sec=ref&sub=ncm&d=1
University of California San Francisco CD
University of Chicago DVD 5 and 7

Electronic material under “Resident Files”
“Essentials of Nuclear Medicine Imaging” (Mettler, Guiberteau)
“PET and PET/CT: A Clinical Guide” (Lin, Alavi)
Oncologic Imaging: A Multidisciplinary Approach by Paul Silverman
Oncologic Imaging: Essentials of Reporting Common Cancer by Hedvig Hricak
AJCC staging manual 7th edition, and NCCN guidelines
NCCN guidelines, available under www.nccn.org
“Nuclear Medicine Case Review” (Zeissman, Rehm)
ACR Syllabi: - Nuclear Medicine II, III, IV, & V
Teaching Files:
Washington University -- http://gamma.wustl.edu/home.html
Harvard -- http://www.jpnm.org/elr.html
Stanford -- http://nuclearmedicine.stanford.edu/education/teaching_files.html
Society of Nuclear Medicine – 
http://www.snm.org/index.cfm?PageID=2208&R PID=10
University Hospitals of Cleveland -- http://www.uhrad.com/
University of Alabama Birmingham -- http://www.rad.uab.edu:591/tf/

7/30/2013
OB/GYN ULTRASOUND

Submitted by: Dr. Karmin and Dr. Hardin
January 25, 2011

Goals and Objectives:

1. Demonstrate learning of the knowledge-based objectives. These are defined in the Resident Manual and further clarified in the assigned readings and other learning assignments for each specific rotation.
2. Demonstrate responsible work ethic. This would include being present at the OB/GYN US work area at 8 A.M and throughout the work day, and attendance at the OB US conference every 3rd Friday and the Maternal-Fetal & NICU conference every 3rd Wednesday. The resident will be expected to present all relevant maternal and pediatric imaging studies with the exception of the obstetric US examination. Worksites include the 5th floor ACC OB/GYN US suite on Monday, Thursday and Friday, Ponder Place OPC (see included site map and directions) on Tuesday and the GYN Procedures Service on the 5th floor of the ACC on Wednesday. The resident will be excused from 7AM radiology conferences in order to arrive at Ponder Place by approximately 8AM.
3. Review the OB/GYN US request, applicable clinical history and prior imaging studies in order to assure appropriateness for the applicable OB or GYN US examination or procedure.
4. Review the relevant ACR Appropriateness Criteria and Standards regarding OB/GYN US and procedures.
5. Perform and/or observe all OB/GYN US examinations or procedures. Technique and bedside manner are especially important since there may be two or more patients during the examinations as well as family of the patient(s). Work well and closely with the OB/GYN US technologist and ask for additional images freely as required to include or exclude a diagnosis. The main task is to observe OB/GYN US examinations, with limited exposure to scanning obstetric patients in conjunction with the sonographer and/or OB/GYN faculty. On Wednesdays the resident will work directly with Dr. Emmi & Dr. Layman observing and performing HSG and SIS procedures, with occasional exposure to pelvic fluid drainage procedures. Perform hand washing before and after ALL patient examinations if you enter the US or procedure suite and have personal contact with the patient.
6. Do in-depth reading and studying order to become knowledgeable about the normal anatomy and physiology of the pregnant and non-pregnant female pelvis and the normal and abnormal developing intrauterine pregnancy as well as the presence of ectopic pregnancy, in order to gain a general understanding of the sonographic appearance of congenital or other disease entities, their clinical presentations, and current modes of treatment as well as accurate differential diagnosis. Other topics will include hysterosalpingography, SIS and MRI of the uterus and female reproductive organs.
7. Attend all OB/GYN US interpretation sessions with applicable faculty. Dictation of all OB/GYN US and procedure results is the responsibility of OB/GYN faculty.
8. All areas of OB/GYN US study are directed towards obtaining ABR certification. This will include review of the ACR and/or OB/GYN departmental ultrasound teaching files on all OB/GYN US rotations. In specific, Dr. Devoe has a detailed PC-based educational curriculum on the 5th floor ACC that all residents should complete.
9. The resident should obtain a copy of the daily work schedule at each work location and explicitly note whether he/she observed the examination/procedure, performed the examination/procedure or was not present. This allows documentation of the number and type of OB/GYN cases observed, scanned or performed. At the conclusion of the OB/GYN rotation the resident will present a copy his/her caseload records to the Radiology Residency Program Director or designee.

The above rotational goals incorporate the core competencies as follows:

Medical Knowledge — Goals 1-9.
Interpersonal and Communication Skills — Goals 2, 5 and 7.

7/30/2013
Resident assessment tools:

- At the beginning of the rotation the resident will review the Resident Manual in order to define the OB/GYN US rotation objectives and expectations. The resident will have a mid rotation discussion of his/her performance so far during the rotation. At the end of the rotation, the OB/GYN faculty member(s) will meet and discuss the resident’s performance during the month and fill out an online evaluation utilizing the One45 web-based system. The applicable OB/GYN faculty or assignee will review the evaluation with the radiology resident near the last day of the rotation. In the unusual case of a substandard performance, this will be brought to the attention of the Radiology Residency Program Director and the resident for further counseling.
- Attendance at OB/GYN US conferences, progress in self-study utilizing the online comprehensive OB/GYN US curriculum maintained in the 5th floor ACC by Dr. Devoe, review of articles and PowerPoint presentations and other relevant educational opportunities.
- 360-degree evaluation process of resident, as feasible, to include OB/GYN faculty, OB/GYN US technologists, technical supervisor, and patients/family.

Benchmarks for Resident Self Evaluation: During the OB/GYN US rotation, the resident is expected to be a motivated self-learner. He/she must read the basic required literature and PowerPoint presentations beginning on the 1st day of the rotation, and actively review and select applicable material from the books and other related resources. It is especially critical to read the 1st two chapters of Nyberg as early as possible (available on .pdf format). The resident will also be expected to begin utilizing the OB/GYN online curriculum available from Dr. Devoe at the 5th floor ACC on Monday, Thursday and Friday as soon as the 1st day in order to learn normal and abnormal anatomy and obstetric measurements. The resident should proactively seek out an OB/GYN US technologist and/or OB/GYN faculty and participate in US observation and actual scanning in order to meet the educational and experiential goals of the rotation. Each OB/GYN case observed, scanned or performed should be documented utilizing the procedure noted in "Goal and Objective" #9, to be signed daily by the relevant OB/GYN faculty. The radiology resident will maintain a copy of the cumulative case log and present it to the Radiology Residency Program Director or designee in order to document global participation and active learning during the OB/GYN rotation.

General Outline of Types of Conditions and Pathologic Entities that will be Reviewed in the Obstetric or Gynecologic US Patient Include:

- Normal anatomy and normal variants (including embryologic basis) that may simulate disease states during pregnancy or in the mature female pelvis.
- Congenital anomalies/diseases of the gravid and non-gravid female pelvis.
- Metabolic disorders (ovarian, reproductive, fetal-maternal and pregnancy)
- Indications for emergency US imaging of the pregnant or non-pregnant female pelvis.
- Benign or malignant masses of the gravid and non-gravid female reproductive organs.
- Infection and inflammation of the female pelvis.
- Vascular disorders to include thrombosis and ischemia as applied to the pregnant and non-pregnant female pelvis.
- Prenatal imaging, ectopic pregnancy, early pregnancy and complications of pregnancy. Issues and procedures pertaining to fertility, loss of fertility or restoration of fertility in the female patient.
- Measurement and documentation of normal and abnormal fetal growth and development.
- Iatrogenic injuries and post-surgical change of the female pelvis.
- Utilization, appropriateness criteria and protocol for ordering US examinations or gynecologic procedures for various clinical conditions.

Initial Rotation in OB/GYN US:
Key Rotation Objectives – Obtain knowledge of the sonographic appearance of the normal and abnormal female pelvis, in the gravid and non-gravid states. Understand the normal and abnormal sonographic appearance of intrauterine pregnancy during all stages of gestation as well as the genesis and detection of ectopic pregnancy. Fetal anatomy and physiology will be broadly divided into one-week segments concentrating on the head, chest, abdomen/pelvis and the extremities. Perform hand washing before and after ALL patient examinations if you enter the US suite and have personal contact with the patient.

The resident will be able to image, document and recognize normal and abnormal features of:

- Early pregnancy.
- Fetal viability, single and multiple gestation, and identification of the yolk sac, gestational sac, and the presence of a fetal pole.
- Crown-rump length (CRL) in early pregnancy.
- Early failure of pregnancy, to include hydatidiform mole, spontaneous abortion and other etiologies.
- Ectopic pregnancy and detailed understanding of B-HCG correlation with last menstrual period (LMP) and with normal and abnormal (ectopic) pregnancy.
- Basic anatomy and physiology of pregnancy from 16 weeks to term, to include shape of the skull, cerebral cortex, choroid plexus and ventricles, nuchal skin fold, the spine in the transverse & longitudinal views, 4-chamber view of the heart and the size/axis of the heart in relationship to the size and position of the thorax, presence or absence of a 3-vessel umbilical cord, basic assessment of amniotic fluid volume, examination of the placenta to include location and morphology, biparietal diameter (BPD) and head circumference (HC), femur length in the pregnant patient.
- Measurements of fetal growth throughout pregnancy.
- Basic anatomy and physiology of the gravid and non-gravid female pelvis, to include uterine size, shape and position, uterine length and three-dimensional measurements, cyclic changes in the thickness and appearance of the endometrium, to include measurement of endometrial thickness, ovarian size and volume in three dimensions, cyclic change in the appearance of the ovaries, measurement of ovarian follicles and corpus luteum and common entities such as uterine fibroids and functional ovarian cystic densities.

The resident will be able to recognize (but not personally document) normal and abnormal features of:

- The posterior fossa and cerebellum.
- Thoracic size and shape.
- Cardiac rate and rhythm.
- Pulmonary size and morphology.
- Abdominal size and shape.
- The diaphragm.
- Liver and umbilical vein(s).
- Stomach.
- Kidneys and bladder.
- Abdominal wall morphology and umbilical cord insertion site.
- Male and female genitalia.
- Four limbs, to include size, shape and movement, including hands and feet.
- Multiple pregnancy, to include monochorionic and dichorionic membranes.
- Abdominal circumference (AC).
- Humerus length.
- Assessment of biometric parameters of normality of growth and accuracy of estimated gestational age when compared to clinical data e.g. last menstrual period (LMP) and uterine size on examination.

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- Fetal breathing, movement, flexion and the biophysical profile scoring system (BPP), with its limitations and interpretation.

Educational Resources [Including the Radiology Library, the OB/GYN library and online resources]:

- Diagnostic Imaging of Fetal Anomalies" by Nyberg. 2003 Lippincott Williams and Wilkins, chapters 1 & 2 at the beginning of the rotation or beforehand. Available as PDF.
  - "Textbook of Fetal Abnormalities" by Twining. 2006 Elsevier/Churchill Livingstone. Utilize selected chapters or subchapters to meet specific goals and objectives.
  - "Diagnostic Imaging: Obstetrics" by Woodard. 2005 Amirsys. Utilize selected chapters or subchapters to meet specific goals and objectives.
  - "Structural Fetal Abnormalities" by Sanders. 2002 Mosby. Utilize selected chapters or subchapters to meet specific goals and objectives.
  - "Pocket Radiologist: Obstetrics" by Woodard. Amirsys 2003 = brief overview of many focal topics.
  - "Pocket Radiologist: Gynecology" by Hricak. Amirsys 2004 = brief overview of selected gynecology topics.
  - "Diagnostic Imaging: Gynecology" by Hricak. 2003 Amirsys. Utilize selected chapters or subchapters to meet specific goals and objectives.
  - "Fundamentals of Diagnostic Radiology" by Brant and Helms. 2007 Lippincott Williams and Wilkins. Chapters 37 & 38.
  - "Pocket Atlas of Obstetric US" by Thieme. This is a brief pocket book designed to be carried during the OB/GYN rotation in order to provide an introduction to NORMAL anatomy. This booklet should be read quickly by every radiology resident rotating in OB/GYN US.
- The PC-based OB/GYN US curriculum available from Dr. Devoe on the 5th floor ACC. This resource should be utilized beginning on the 1st day.
  - www.thefetus.net
  - PowerPoint presentation entitled "Basic US 1 and 2 Trimesters AIUM". This reviews all OB US measurements and technique, and should be viewed on the 1st day of the rotation. This document is available at or before the rotation begins.
  - "AIUM Practice Guidelines for the Performance of Obstetric US Examinations". Available as a PDF at or before the rotation begins.
  - "HSG Pictorial Review Article" and "HSG Review and examples". Both are available as PDF at or before the rotation begins.

Supplementary Resources:
- Review of OB/GYN US In-service questions and ACR teaching file.
- Powerpoint presentation entitled "US OB Review-QA Style (#1-61). Available as PDF at or before the rotation begins.

7/30/2013
Advanced Elective Rotation in OB/GYN US

Key Rotation Objectives – The resident and OB/GYN faculty will work with the applicable Radiology Residency faculty and craft an individualized rotation designed to specifically accent focal skills or procedures the radiology resident wishes to stress as part of his/her overall educational experience in US. The existing educational goals and resources may be utilized, with additional texts or online materials as needed. The resident will increase his/her expertise in selected areas of knowledge pertaining to the sonographic appearance of the normal and abnormal female pelvis, in the gravid and non-gravid states, and the sonographic appearance of intrauterine pregnancy during all stages of gestation as well as the genesis and detection of ectopic pregnancy. Specific gynecological procedures may be included. Perform hand washing before and after ALL patient examinations if you enter the US suite and have personal contact with the patient.
ROUTE SUMMARY

1. 1120 15th St, Augusta, GA 30912-0004
2. 618 Ponder Place Dr, Evans, GA 30809-3185

STEPS: 10  EST. DRIVE TIME: 24 minutes  EST. DISTANCE: 12 miles

FROM: 1120 15th St
Augusta, GA 30912-0004

TO: 618 Ponder Place Dr
Evans, GA 30809-3185

1. You are at 1120 15th St, Augusta, GA 30912-0004

2. Go Northeast on GA-4 (15th St)  0.4 miles

3. Continue onto 15th St  0.3 miles

4. Turn left onto St. Lukes St  < 0.1 miles

5. Take GA-28 W ramp  0.2 miles

6. Continue onto GA-28 (Calhoun Expwy, Savannah River Scenic Hwy)  5.1 miles

5.1 miles

7/30/2013
Pediatric Radiology Rotation Goals and Objectives

Submitted by: Dr. Dao and Dr. Lewis
September 2012

Special Instructions for Rotation:
- Arrival time and location on first day of rotation:

Evaluation Resident for Rotation:
- Residents are to ask their attending for verbal feedback at the midpoint of the rotation.
- Written evaluations of the resident will be completed by the faculty in One45.

Evaluation Faculty for Rotation:
- Written evaluations of the resident will be completed by the faculty in One45.

First Pediatric Rotation:
After completing the first rotation in Pediatric radiology, the resident should be able to:
- Demonstrate learning of knowledge based objectives and mastery of technical objectives for the first rotation
- Communicate effectively with patients, referring clinicians, technologists and attendings
- Demonstrate appropriate judgment skills
- Obtain essential patient information pertinent to the radiologic examination
- Demonstrate a responsible work ethic
- Participate in quality improvement/quality assurance activities
- Participate in the education of students, interns, observers and residents from other departments

Intermediate Pediatric Rotation:
After completing the intermediate level rotations in Pediatric radiology, the resident should be able to:
- Demonstrate learning of knowledge based objectives and mastery of technical objectives for the second and third rotations
- Continue to build and improve on skills developed during the first rotation
- Develop skills in protocoling and monitoring CT and routine MR examinations
- Demonstrate an understanding of the ACR Appropriateness Criteria and ACR Practice Guidelines and Technical Standards for Pediatric imaging
- Participate in the education of junior residents, interns, and medical students
- Observe and participate in image guided procedures

Advanced Pediatric Rotation:
After completing the fourth four-week rotation in Pediatric radiology, the resident should be able to:
- Demonstrate learning of knowledge based objectives and mastery of technical objectives for the fourth rotation
• Continue to refine skills developed during the first three rotations
• Effectively use information technology to address clinical problems
• Participate in the education of junior residents and medical students
• Become a more independent provider of Pediatric radiologic interpretive services
• Manage clinical and technical questions from technical and support staff

Pediatric Radiology Rotation Goals and Objectives
Submitted by: Dr. Dao and Dr. Lewis
September 2012

Objectives: General Overview: Radiology resident rotations in Pediatric Imaging will include at least 4 months during the residency program, all of which will be at the Children’s Medical Center. The specific goals include objectives required for every level of training with graded supervision by the attending faculty. All aspects of Pediatric radiology will be incorporated into the rotation, except pediatric neuroimaging, nuclear medicine, and interventional procedures which will be incorporated in other sections.

Resident Responsibilities

1. The resident is involved in the daily conduct of Pediatric Radiology services. At the start of every working day, the resident should be familiar with the patient schedule and anticipate needs for any procedures. The resident will check requisitions to evaluate for appropriateness of the requested procedure or if additional exams/protocol needs to be performed. Requests lacking clinical indication or seemingly inappropriate requests will be clarified and discussed with referring physician.
2. The resident assigned to Pediatric Radiology is expected to be available for consultation by pediatric imaging technologists, clinicians and other health care professionals during regular work hours except during conference times, when attending faculty will cover.
3. Examinations should be checked by the resident before the patient leaves the department if requested to do so by the supervising faculty.
4. Questions should be referred to the supervising faculty to which the resident is assigned.
5. Preliminary reports may be written for emergency room studies and patients who are going to clinic appointments on the same day of the examination when appropriate. These reports should be communicated to attending radiologist and documented in the final report with name, date and time of such a communication.
6. Review of cases with the supervising faculty will be conducted as many times in the day as necessary to keep an efficient work flow.
7. All examinations should be dictated by the end of every working day.
8. The resident will check his/her reports prior to final verification by supervising faculty.
9. During the first rotation, the resident should focus on plain radiograph interpretation and acquiring fluoroscopic skills. By the end of the first rotation, the resident should feel comfortable evaluating plain radiographs for emergent conditions such as necrotizing enterocolitis and pneumoperitoneum and should also feel comfortable performing upper GI examinations, modified barium swallow studies, and voiding cystouretherograms.
10. During the second rotation, the resident should focus on developing skills in interpreting ultrasound, CT, and MRI examinations on children, particularly studies unique to children such as cranial ultrasound and ultrasound for pyloric stenosis. The resident should build on prior experience in plain radiograph interpretation and fluoroscopy, gaining confidence in enema examinations and less common procedures such as fistulograms.
11. During the third rotation, the resident should become confident handling multiple modalities throughout the day. Effort should made to fill in any gaps in knowledge and experience in all modalities such as rare diseases and syndromes seen on plain radiographs, more advanced fluoroscopic techniques such as intussusception reduction, and complex diagnoses in ultrasound, CT and MR imaging.

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Staff Responsibilities:
1. Supervising faculty should be available at all times for any questions or consultations needed by the resident.
2. Supervising faculty should review all cases with the resident before the end of the day.
3. Supervising faculty should provide the resident with constructive feedback in any problem areas encountered during the rotation as well as through rotation evaluations.
4. Supervising faculty should sign resident-generated reports in a timely manner and inform the resident of any major changes he/she made.

Pediatric Radiology
1. **Patient Care:**
   a) The resident should have knowledge of indications for the examinations requested. When the reason for the examination is not clear, the resident should effectively communicate with the patient or referring physician until this is clarified.
   b) The resident should be familiar with available medical records and how to access them for purposes of patient care.
   c) All studies should be reviewed with supervising faculty attending.
   d) Preliminary reports should be made available to all referring clinicians if needed prior to final review of cases. If there is a significant discrepancy between the preliminary reading and final reading, the resident should notify the referring clinician immediately.

2. **Medical Knowledge:**
   a) Identify normal/abnormal airways on chest x-ray of the infant or older child.
   b) Identify abnormalities requiring emergent surgical management. Learn to interpret pediatric chest radiographs in infants and older children.
   c) Identify normal vs. abnormal skeletal structures (especially extremities on a bone survey).
   d) Describe the proper procedure for fluoroscopy of an infant/older child.
   e) Establish bone age on the basis of radiographic findings.
   f) Make preliminary review of outpatient and pediatric ICU films and discuss findings with radiologist, then dictate as directed.
   g) Assist the technologist in preparation of the patient for fluoroscopic examination (e.g.; enemas, etc.).
   h) Interpret ultrasound examinations, particularly those unique to children such as cranial, hip, and spine sonography.
   i) Interpret CT and MR examinations in children, with particular understanding of radiation exposure and sedation issues in the pediatric population.
   j) Complete all the modules on the COMET website (www.echs.net/onlinelearning/mainmenu.asp)

3. **Practice Based Learning and Improvement:**
   a) The resident should demonstrate evidence of independent reading and learning through the use of printed and electronic sources.
   b) Follow-up of abnormal or interesting studies should be accomplished through communication with the referring physician and/or patient medical records.
   c) Residents should assist with preparation and presentation of cases for pediatric interdisciplinary conferences when requested by the attending physician.
4. **Interpersonal Communication Skills:**
   a) The resident should be able to communicate effectively results of studies to referring clinicians whenever needed. For emergent studies, reports to referring clinicians should be made in a timely manner.
   b) The resident should be able to effectively convey the findings of examinations through accurate dictation of reports.
   c) Residents should discuss fluoroscopic procedures and study results with children and their families when requested to do so by supervising faculty.

5. **Professionalism:**
   a) Recognize limitations in personal knowledge and skills, being careful to not make decisions beyond the level of personal competence.
   b) Residents should be able to explain the nature of the examination or findings in an examination to patients and their families when needed.
   c) Residents should observe ethical principles when recommending further work-up cases.
   d) Promptness and availability at work are expected of every resident.
   e) Residents should dress appropriately at work, wearing a name badge at all times.
   f) Pediatric radiology technologists and other members of the department should be treated with respect as part of the health care team.
   g) Patient confidentiality should be observed at all times.

6. **System Based Practice:**
   a) Residents should be familiar with departmental procedures necessary in the performance of the examination.
   b) Residents should learn appropriate language to be used in communicating to clinicians through reports or consultations so proper management decisions can be made.
   c) Proper dictations should be made with indications, technique, findings and conclusions.
   d) Residents should dictate and correct their reports in a timely fashion to avoid delay in patient disposition.
   e) Residents should assist in facilitating examinations whenever possible.
   f) Residents should recognize the role that nuclear medicine plays in the management of patient’s illness and make proper recommendations when needed.
   g) Residents are encouraged to make suggestions to improve methods and systems utilized in radiology whenever appropriate.

### Reading List:

**1st year residents:**
2. Pediatric Radiology Curriculum online Modules ([www.cchs.net/pediatricradiology](http://www.cchs.net/pediatricradiology))

**2nd year residents:**
1. Donnelly LF. *Diagnostic Imaging Pediatrics, 2nd ed.*, 2011
2. ACR Syllabus

**3rd and 4th year residents:**
1. Case Review ACR Learning Files
2. Univ of Chicago DVD Set
3. UCSF Radiology Review DVD

### Radiologic Physics
Statement of Purpose:
A firm knowledge of radiologic physics is essential for radiology residents to prepare for a lifetime career in this ever-changing technological field. Radiologic physics training is provided as part of the residency experience so that residents may:
1. Understand the physical principles of the procedures and technologies for which radiologists have prime responsibility.
2. Have a clear understanding of the operation, capabilities and limitations of the diagnostic technologies used in their specialty.
3. Communicate effectively with technologists, service engineers, vendor representatives, quality control personnel and medical physicists regarding equipment selection, technique parameters and regulatory compliance.
4. Understand the ethical, regulatory and legal concern for patient and employee safety.
5. Become familiar with the federal Mammography Quality Standards Act (MQSA) and the requirements and duties of the designated MQSA physician for an FDA approved Mammography site.
6. Have the required knowledge base to serve as an institutional resource on matters relating to radiation, radiation emergencies and terrorism, and imaging safety (e.g. Radiation Safety Officer).
7. Become an authorized user on a radioactive materials license and thus administer radioisotopes for diagnostic purposes.
8. Pass the physics portion of the American Board of Radiology (ABR) certification examination.

One of the roles of a radiology residency program is to prepare residents for certification in Diagnostic Radiology by the American Board of Radiology (ABR). The certification process requires passing examinations, which covers diagnostic physics and equipment including basic physics, x-ray (film/screen and digital acquisition), mammography, CT, ultrasound, nuclear medicine/PET, MRI, PACS, RIS, Digital Image Processing, radiation and imaging safety, image quality, and quality control.

The ABR Board of Trustees requires a written statement from the applicant's program director attesting that the applicant will have satisfactorily completed the required special training and achieved adequate professional qualifications for the examination in Diagnostic Radiology by the appointed time, and is prepared to take that examination. The Board encourages residency program directors to utilize in-training examinations to assess the progress of residents in training, to identify individual and/or programmatic strengths and weaknesses and in general to improve graduate radiological education.

Faculty Expectations of Radiology Residents
1. Attendance: Residents are expected to regularly attend all physics classes and labs during their first year. The radiology faculty is committed to physics education and will do everything possible within the constraints of patient care to avoid scheduling conflicts with physics classes and labs. Attendance will be monitored, shared with clinical faculty, and used as part of resident evaluations. Attendance will be given special scrutiny for students with sub-standard scores on internal and standardized exams. The faculty understands that because of the nature of a residency, there will be occasional clinical and personal conflicts that will make it impossible for a resident to attend class. It is anticipated, however, that except for special circumstances the frequency of such occurrences should be approximately the same for all residents. Residents who do not pass the physics portions of ABR exams will have an individual remediation plan.
2. Participation in medical physics clinical support services: As part of the residency training experience, residents are expected to become familiar with clinical support services provided by medical physicists. They will be given the opportunity to participate in such activities as shielding calculations, fetal dose calculations, radiological equipment selection, technical specifications, and the purchase process.
3. In-training Physics Examinations: Periodic examinations will be given to allow both the resident and faculty to evaluate performance. Residents are expected to score 70% or higher on each physics examination. Missed exams or exams for which a minimum score of 70% was not achieved must be (re-)taken and must receive a minimum score of 70% within four weeks of the original exam date, unless alternate arrangements are made with the residency program director as a result of extenuating circumstances. It is up to the
individual resident to contact the appropriate physics faculty and schedule make-up exams. Failure to achieve at least a score of 70% on all internal physics examinations will be used by the program director as an indication the resident is not prepared to take the ABR certification exam.

Radiology Research Rotation
Submitted by: Dr. Yanasak, and Dr. Johnson

Special Instructions for Rotation:
• Arrival time and location on first day of rotation:

Evaluation Resident for Rotation:
• Residents are to ask their attending for verbal feedback at the midpoint of the rotation.
• Written evaluations of the resident will be completed by the faculty in One45.

Evaluation Faculty for Rotation:
• Written evaluations of the resident will be completed by the faculty in One45.

First Research Rotation:
After completing the first rotation in Research radiology, the resident should be able to:
• Demonstrate learning of knowledge based objectives and mastery of technical objectives for the first rotation
• Communicate effectively with patients, referring clinicians, technologists and attendings
• Demonstrate appropriate judgment skills
• Obtain essential patient information pertinent to the radiologic examination
• Demonstrate a responsible work ethic
• Participate in quality improvement/quality assurance activities
• Participate in the education of students, interns, observers and residents from other departments

Intermediate Research Rotation:
After completing the intermediate level rotations in Research radiology, the resident should be able to:
• Demonstrate learning of knowledge based objectives and mastery of technical objectives for the second and third rotations
• Continue to build and improve on skills developed during the first rotation
• Develop skills in protocoling and monitoring CT and routine MR examinations
• Demonstrate an understanding of the ACR Appropriateness Criteria and ACR Practice Guidelines and Technical Standards for Research imaging
• Participate in the education of junior residents, interns, and medical students
• Observe and participate in image guided procedures

Advanced Research Rotation:
After completing the fourth four-week rotation in Research radiology, the resident should be able to:
• Demonstrate learning of knowledge based objectives and mastery of technical objectives for the fourth rotation
• Continue to refine skills developed during the first three rotations
• Effectively use information technology to address clinical problems
• Participate in the education of junior residents and medical students
• Become a more independent provider of Research radiologic interpretive services
• Manage clinical and technical questions from technical and support staff
Radiology Research Rotation
Submitted by: Dr. Sostre, Dr. Yanasak, and Dr. Johnson
September 16, 2011

Goals and Objectives:

ACGME requirements:
From Section IV.B.2.b: During their training, all residents must engage in a scholarly project under faculty supervision. This may take the form of laboratory research, or clinical research, or the analysis of disease processes, imaging techniques, or practice management issues. The results of such projects must be published or presented at institutional, local, regional, or national meetings, and included in the resident's learning portfolio. The program must specify how each project will be evaluated.

Overview:
The Radiology Research Rotation consists of a month-long immersion in a Radiology-based research project with Departmental faculty members. Before the rotation occurs (i.e., during the spring and summer of PGY II), residents will engage in a period of preparation for the rotation. A Radiology Grand Rounds consisting of a talk mentored by the Human Assurance Committee (HAC) will be scheduled in April or May. During this time, residents will choose a Radiology faculty member to act as an advisor or mentor, who will also serve as the Rotation Supervisor for the resident. The resident and mentor will develop a preliminary sketch of the research project, including the purpose and general method, that will be submitted as a one-page document to the Resident Program Director before July 1st.

At the end of PGYII and at the beginning of PGYIII, residents will engage in two activities before their rotation. First, a brief reading list of articles will be given to residents, after which a simple test will be administered to insure that the resident understands basic principles of research design and ethics. Next, the research project must be developed into a brief talk (~15 minutes), for presentation to the residents and appropriate faculty. Presentation of the project will serve three purposes: 1) to allow other residents an opportunity to offer constructive criticism of benefit to the project; 2) to insure that the resident has organized his research project approach before the rotation; and 3) to document that the Resident Program Director and Rotation mentor have approved the project. A paper form of the presentation will be placed in each resident's portfolio. When applicable (i.e., depending on the nature of the project), a HAC application should be put together before the presentation. In this manner, the application can be submitted promptly to the HAC after incorporating revisions recommended by the other residents.

In the case that the proposal is not approved (e.g., HAC rejects the proposal, late submission of a written summary), the resident will be reassigned to a different Radiology rotation at the discretion of Resident Program Director. Under these circumstances, the Resident Program Director and the resident will establish a new timeline together for completion of the research rotation.

After gaining prior approval of the project and approval by HAC, residents on the Research rotation will dedicate four weeks to pursuing their project. Each resident will schedule regular meetings with the Rotation mentor to discuss research analysis and development. In addition to the rotation, residents will be expected to attend all conferences. They will also be expected to remain on-campus until the close of the clinical day, as applicable to the project. The resident should be available by pager and dressed professionally during the rotation.

At the end of the rotation, the Rotation Mentor will evaluate formally the performance of the resident consistent with guidelines of other rotations. Each project in the Research rotation will culminate successfully with either a publication or a talk.

Objectives:
9. To familiarize residents with areas of academic research relevant to Radiology, which may serve to advance the practice of the field.
10. To fulfill the ACGME requirement for a research component as part of the residency training, a valuable learning tool.
11. To foster development of the analytical skills necessary for critical review of Radiology literature, for determining the appropriateness of study design, methodology and statistical analysis.
12. To cultivate a broad understanding of the principles involved in animal, human, and/or technical research at MCG, through the design and execution of a Research Project.
13. To offer opportunities to residents for development of publication and/or presentation quality material.

Resources:
Selections from these resources will be used as an optional reading list on research design and methodology:
- “Interpreting the Medical Literature” by Stephen H. Gehlbach
- “Understanding Medical Literature” by Lou Fintor
- Training Modules on the MCG HAC website

Prerequisites to Complete before Research Rotation:
- Attend the Grand Rounds talk about HAC procedures (April/May PGYII)
- Choose a Rotation Mentor from Research Faculty (by June 1st, PGYII)
- Submit a brief (~1pg) project proposal to Residency Program Director (by June 30th, PGYII)
- Present a brief talk to Residents and Faculty concerning the project (August, PGYIII).
- Prepare a HAC submission for the Project, and submit this to the Rotation Mentor and Residency Program Director (by August 1st, PGYIII; Exception: for PGYIII in 2010-11, by Sept. 30th)
- Submit materials to HAC (by September 1st, PGYIII; Exception: for PGYIII in 2010-11, by Oct. 30th)
- Review reading list on research design and methodology and take test (before 1st rotation in November, PGYIII)
- Complete on-line training for animal and human research at MCG, where applicable (before 1st rotation in November, PGYIII).

Measures of Successful Completion of Radiology Research Rotation:
- Satisfactory evaluation by the Rotation Mentor
- Generation of one of the following: i) Publication of abstract or paper in institutional/local/regional/national conference proceedings; ii) presentation of a talk in institutional/local/regional/national meeting.

Resident Assessment Tools:
At the beginning of the rotation, the resident will be presented with the rotation objectives and expectations. The resident will have a mid-rotation discussion of his/her performance with the Rotation Mentor during the first half of the rotation. The Rotation Mentor will provide a written evaluation at the conclusion of the rotation, and he/she will review the evaluation with the resident near the last day of the rotation. In the unusual case of a substandard performance, the Residency Program Director will be notified for further counseling of the resident.

Forms/Example Proposals:
- Project proposal (see Appendix A)
- Research Rotation Check-off List (see Appendix B)

7/30/2013
Appendix A: Sample project proposal

I, Manish Shah, propose to work with Dr. Nathan Yanasak (Dept. of Radiology) on my research rotation. The rotation will cover the period of 2010 January 11th- 2010 March 5th. I will attend split clinical rotations during this period, using my afternoon for the research rotation.

The project that Dr. Yanasak and I will work on is tentatively entitled “SNR characteristics of Phased-Array coils”. This project will examine the effect of ROI size and placement on SNR measurements using an MRI phased-array coil. The expected outcome of this project includes an abstract submission to the 2010 American Association of Physicists in Medicine Annual Meeting in Philadelphia, for publication in the conference proceedings that appear in Medical Physics.

Sincerely,

__________________________________  ____________________
Manish Shah, M.D.                                                                                   Date
Appendix B: Research Rotation check-off List

<table>
<thead>
<tr>
<th>Anticipated Completion Date</th>
<th>Requirements</th>
<th>Date Completed</th>
<th>Comments</th>
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<tbody>
<tr>
<td></td>
<td>Attend the Grand Rounds talk about HAC procedures (April/May PGY II</td>
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<tr>
<td></td>
<td>Choose a Rotation Mentor from Research Faculty (by June 1&lt;sup&gt;st&lt;/sup&gt;, PGY II</td>
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<tr>
<td></td>
<td>Submit a brief (~1 pg) project proposal to Residency Program Director (by June 30&lt;sup&gt;th&lt;/sup&gt;, PGY II)</td>
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<tr>
<td></td>
<td>Present a brief talk to Residents and Faculty concerning the project (Aug., PGY III)</td>
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<td></td>
<td>Prepare a HAC submission for the project, and submit this to the Rotation Mentor and Residency Program Directory (by Aug. 1&lt;sup&gt;st&lt;/sup&gt;, PGY III; exception: for PGY II in 2010-11, by Oct 30&lt;sup&gt;th&lt;/sup&gt;)</td>
<td></td>
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<td></td>
<td>Submit materials to HAC (by Sept. 1&lt;sup&gt;st&lt;/sup&gt;, PGY III, exception: for PGY III in 2010-11, by Oct. 30&lt;sup&gt;th&lt;/sup&gt;)</td>
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<td></td>
<td>Preview reading list on research design and methodology and take test (before 1&lt;sup&gt;st&lt;/sup&gt; rotation in Nov., PGY III)</td>
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<tr>
<td></td>
<td>Complete on-line training for animal and human research at MCG, where applicable (before 1&lt;sup&gt;st&lt;/sup&gt; rotation in Nov., PGY III)</td>
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<tr>
<td></td>
<td>Satisfactory evaluation by the Rotation Mentor</td>
<td></td>
<td></td>
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</tbody>
</table>
Generation of one of the following: i) Publication of abstract or paper in institutional/regional/national conference proceedings; ii) presentation of a talk in institutional/local/regional/national meeting

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Ultrasound Goals and Objectives

**Body Imaging Ultrasound Goals and Objectives**

**Goals and Objectives for ALL Body Imaging/US Rotations**

1. Demonstrate learning of the US knowledge based objectives
2. Review the request, applicable clinical history, previous laboratory tests and previous imaging studies to be certain that the proper test has been ordered. If the indication for the examination is unclear contact the referring health care providers.
3. Perform all examinations in the appropriate way. If you have a question, ask before performing the examination. Technique is perhaps more important in US than in any other modality. Work well with the US technologist and ask for additional images freely as required to include or exclude a diagnosis. *Perform hand washing before and after ALL patient examinations if you enter the US suite and have personal contact with the patient.*
4. Accurately dictate all studies in a timely fashion
5. Communicate effectively and courteously with referring clinicians, to include obtaining relevant history for study interpretation and communication of important findings on studies performed. Serve as a consultant to referring physicians regarding US imaging.
6. Demonstrate learning of the clinical indications for utilizing body imaging examinations, including advanced US imaging. Initially observe, and then learn how to perform portable US examinations.
7. Demonstrate responsible work ethic. This includes being present at the CT station at 7:30 A.M, or after lecture when applicable and throughout the work day, timely dictation of all reviewed studies, and attendance at all departmental teaching conferences and grand rounds presentations.
8. Facilitate the learning of medical students, peers and others in the US service.
10. Contribute AT LEAST 1 case per rotation to the Radiology Department Teaching File
11. All areas of study are directed towards obtaining ABR certification. This will include review of the ACR ultrasound teaching files.
13. Follow up results of surgery or examinations performed by other clinical services to determine final diagnosis.

The US/Body Imaging rotational goals incorporate the following core competencies
Medical Knowledge: Goals 1 through 13
Interpersonal and Communication Skills: Goals 2, 4, 5, 6, 8, 12 and 13
Practice Based Learning and Improvement: Goals 2, 3, 4, 5, 6, 10, 12 and 13
Professionalism: Goals 2, 4, 5, 6, 7, 8 and 9
Patient Care: Goals 2, 3, 4, 5, 6, 9 and 13

The US/Body Imaging resident assessment process utilizes the following techniques

A. Assessment tools utilized include global ratings by faculty including rotation evaluation sheet, conference attendance logs and In-service examination results.
B. Plan includes Develop 360 degree evaluations by staff to include: all technologists on day shift in radiology core, technology supervisor for radiology, and body imaging fellows (if applicable).
C. At the beginning of the rotation the resident will review the Resident Manual in order to define the rotation objectives and expectations. The resident will have a mid rotation discussion of his/her performance. At the end of the rotation, the US faculty members of the section will meet with the resident and discuss the resident’s performance during the month. In the unusual case of a substandard performance, this will be brought to the attention of the Residency Program Director and the resident for further counseling.
D. Benchmarks for Resident Self Evaluation: During every training rotation, the resident is expected to utilize the suggested resources. This will include the ACR US teaching file in later rotations. Over time, he/she should become progressively more knowledgeable about normal sonographic anatomy, applied physics, physiology, and sonographic appearances of disease processes evaluated utilizing US as correlated with related CT, fluoroscopy or other available imaging examinations. This requires knowledge within many organ systems. In addition, he/she should increasingly understand clinical presentations and current modes of treatment. During every rotation, the resident is expected to share knowledge with medical and tech students, as well as more junior residents. In the first rotation the resident will be introduced to operation of the US machine, followed by increasingly autonomous portable scanning assignments in later rotations.

General outline of pathology and anatomy to be reviewed in the adult US patient include

- Normal anatomy and normal variants (including embryologic basis) that may simulate disease states.
- Congenital anomalies/diseases.
- Traumatic injuries.
- Metabolic disorders (thyroid, parathyroid and others)
- Indications for emergency US imaging.
- Benign or malignant masses.
- Infection and inflammation.
- Peripheral and central vascular disorders to include thrombosis, stenosis or ischemia.
- Prenatal imaging, ectopic pregnancy, early pregnancy and complications of pregnancy. Issues pertaining to fertility or loss of fertility.
- Iatrogenic injuries and post-surgical change.
- Obstruction, perforation, leak, stricture, hernias and related pathology.
- Utilization, appropriateness criteria and protocol for ordering US examinations for various clinical conditions.
- Operation of the US machine and scanning techniques for portable examinations.
First Year Radiology Resident (Rotation I)

Key Rotation Objectives: Learn basic general and small parts US anatomy plus common emergency US examination indications and interpretation. Learn penile Doppler and injection technique for erectile dysfunction evaluation. The resident should always wash his/her hands before and after entering the US room during the course of a procedure or examination that they are personally involved in. Observation and US scanning will be introduced to the resident. The faculty will read US exams while the resident is scanning or observing.

- On the first day of the rotation, the resident will directly observe a series of common US examinations being performed and then he/she will learn introductory techniques of scanning and image production. This is preparation for actual directed, then autonomous scanning assignments in subsequent rotations. Document the types of exams observed/performe
- US anatomy of the male and female pelvis, venous system of the arms and legs, thyroid gland, scrotum, kidneys, and abdomen.
- Learn basic principles of Doppler Duplex US and applications in portal venous and peripheral vascular applications.
- In preparation for call, gain competency in the diagnosis of: ectopic pregnancy and other female pelvic conditions, scrotal pathology to include orchitis and torsion, cholecystitis, hydronephrosis, deep and superficial venous thrombosis of the arms or legs, biliary distension, renal transplant US imaging, peripheral AV fistula, hematoma, and pseudoaneurysm.
- Learn penile US and understand how the injected medications work and what affects they produce on the underlying penile vascular bed.
- Learn to dictate most of the common US examinations as noted above, with limited faculty supervision by the end of the rotation. Utilize sample dictations as well as review relevant articles.

Educational Resources

- "Fundamentals of Diagnostic Imaging" by Brandt & Helms, Chapters 36-40 Introduction to General, Small Parts, Vascular and OB US
- The Requisites: Ultrasound, Chapters 1-11, 22-23 General, Vascular, and Small Parts US
- Review PowerPoint Presentations regarding Ultrasound Anatomy, ER GYN, Small Parts, DVT and SVT, Liver, GB and US of Renal-Liver-Pancreas TX.

Articles:

- “Liver PV & HV & HA Doppler Patterns” = Review collection of key article data assembled as a single unit.
- “Thyroid Nodule Diagnosis and Lymph Node Evaluation” = Review collection of key article data assembled as a single unit.
- “Renal Artery Stenosis Parameters” = Review collection of key article data assembled as a single unit.
First Year Radiology Resident (Rotation II)

Key Rotation Objectives – Expand knowledge base to include most of peripheral vascular US and related vascular topics. The resident should be able to decide when to cancel or expand US exams and when to enter the room and scan. The attending should serve primarily as a consultant by the end of this rotation. All call-related US techniques should be mastered. The resident will spend afternoons on the first week performing portable US examinations, with the assistance of the US technologist, followed by autonomous scanning during the second week in the afternoons. The resident should always wash his/her hands before and after entering the US room during the course of a procedure or examination that they are personally involved in.

- The resident will spend afternoons on the first week performing ALL portable US examinations, with the assistance of the US technologist. During afternoons of the second week the resident will autonomously perform ALL portable US examinations, using the US technologist as a consultant only. The faculty will support the service while the resident is scanning.
- Document the types of exams observed/ performed.
- Learn vascular US anatomy and pathophysiology, to include unusual manifestations of venous thrombosis, peripheral arterial disease (PAD), segmental plethysmography, vein mapping, venous reflux, and arterial graft examinations and renal artery stenosis. The concepts of vascular patency, stenosis, occlusion or other abnormal conditions are stressed in this rotation.
• Begin a more detailed understanding of mass lesions and their US characteristics, in conjunction with CT, MR and other modalities. This will produce a unified multimodality concept of lesion imaging with emphasis on discerning malignant vs. benign.

• Learn to dictate all common US examinations and most of the less common ones with limited faculty supervision by the end of the rotation. Become fully prepared for emergent US imaging.

### Educational Resources

- "Ultrasonography in Vascular Diseases: A Practical Approach to Clinical Problems" by Bluth 2008 Thieme 126 pages-review
- “Introduction to Vascular US”, by Zwiebel, Chapter 17 HD Grafts and Vein Mapping US, Chapters 13-16 UE PVD and Segmental Plethysmography
- Review PowerPoint Presentations regarding Segmental Plethysmography and PVD .

### Articles:

- Review books and articles from 1st US rotation as required.

### Supplementary Educational Resources

- "Diagnostic Ultrasound" by Rumack, Chapters 4-17, 21, 22, 24 General US Topics
- There are two yellow folders entitled “Vascular US 1/2” and “Vascular US 2/2”. These contain a printout of the segmental plethysmography PowerPoint lectures and a series of vascular US articles.
- ACR Syllabus #50 = "US" and ACR Videodisc on US.
Articles:

Second Year, Third Year and Fourth Year Radiology Residents

Key Rotation Objectives: Consolidate knowledge of general and small parts and vascular US and begin review of prostate US. The resident should run the US section as an autonomous service with little direct assistance by the attending faculty. Independent scanning of patients will continue to be stressed in order to maintain and improve skills. The resident should always wash his/her hands before and after entering the US room during the course of a procedure or examination that they are personally involved in.

- The resident will again spend afternoons on the first week performing ALL portable US examinations, with the assistance of the US technologist. During afternoons of the second week the resident will autonomously perform ALL portable US examinations, using the US technologist as a consultant only. Additional scanning is strongly encouraged during the third week of the rotation. The faculty will support the service while the resident is scanning. Document the types of exams observed/ performed.
- Consolidate overall vascular US principles, and realize that all vascular beds operate in a similar manner and are imaged using the same basic techniques.
- Learn GI US pertaining to hernias and specialized applications.
- Learn to dictate all general, small parts, emergency and vascular US examinations with minimal faculty supervision. The US section is yours to manage and direct, with faculty serving as your consult service.

Educational Resources

- “Introduction to Vascular US”, by Zwiebel, Chapters 18-19 PVD by Duplex US and Post-Intervention US, Chapter 26 Chronic Venous Insufficiency US.
- “Vascular Diagnosis”, Chapters 18-20 PVD by Duplex and Segmental Plethysmography, Chapter 29 PSA Diagnosis and Treatment by US, Chapter 30 UE PVD Diagnosis and US, Chapter 31-32 RAS, Chapter 23 Skin PO2Perfusion and Monitoring in Ischemia, Chapter 33-34 Mesenteric Arterial Diagnosis and Intervention.
- There are two yellow folders entitled “Vascular US 1/2” and “Vascular US 2/2”. These contain a printout of the segmental plethysmography PowerPoint lectures and a series of vascular US articles.
Articles:

- Review articles from 1st and 2nd US rotation as required.

Supplementary Educational Resources

- ACR Syllabus #50 = "US" and ACR Videodisc on US.
- "Diagnostic Ultrasound" by Rumack, Chapter 20 Intraoperative US, Chapter 25-26, 61 MSK and Pediatric MSK US, Chapter 18 US-Guided Biopsy Techniques
- Review of US In-service questions.
- "Ultrasoundography in Vascular Diseases: A Practical Approach to Clinical Problems" by Bluth 2008 Thieme 126 pages-review as supplementary reading.

Breast Imaging Goals and Objectives
Submitted by Dr. Sostre and Dr. Abrahams
September 16, 2011
Special Instructions for Rotation:
- Arrival time and location on first day of rotation:

Evaluation Resident for Rotation:
- Residents are to ask their attending for verbal feedback at the midpoint of the rotation.
- Written evaluations of the resident will be completed by the faculty in One45.

Evaluation Faculty for Rotation:
- Written evaluations of the resident will be completed by the faculty in One45.

First Breast Imaging Rotation:
After completing the first rotation in Breast Imaging radiology, the resident should be able to:
- Demonstrate learning of knowledge based objectives and mastery of technical objectives for the first rotation
- Communicate effectively with patients, referring clinicians, technologists and attendings
- Demonstrate appropriate judgment skills
- Obtain essential patient information pertinent to the radiologic examination
- Demonstrate a responsible work ethic
- Participate in quality improvement/quality assurance activities
- Participate in the education of students, interns, observers and residents from other departments

Intermediate Breast Imaging Rotation:
After completing the intermediate level rotations in Breast Imaging radiology, the resident should be able to:
- Demonstrate learning of knowledge based objectives and mastery of technical objectives for the second and third rotations
- Continue to build and improve on skills developed during the first rotation
- Develop skills in protocoling and monitoring CT and routine MR examinations
- Demonstrate an understanding of the ACR Appropriateness Criteria and ACR Practice Guidelines and Technical Standards for Breast Imaging imaging
- Participate in the education of junior residents, interns, and medical students
- Observe and participate in image guided procedures

Advanced Breast Imaging Rotation:
After completing the fourth four-week rotation in Breast Imaging radiology, the resident should be able to:
- Demonstrate learning of knowledge based objectives and mastery of technical objectives for the fourth rotation
- Continue to refine skills developed during the first three rotations
- Effectively use information technology to address clinical problems
- Participate in the education of junior residents and medical students
- Become a more independent provider of Breast Imaging radiologic interpretive services
- Manage clinical and technical questions from technical and support staff

Goals and Objectives for All Breast Imaging rotations

1. Patient Care
   a. Review history of the patient for whom a diagnostic mammogram, breast ultrasound, breast MR or interventional procedure has been ordered, and determine the appropriate protocol for the study requested and the clinical question to be answered.
   b. Retrieve studies.
   c. Correctly protocol diagnostic mammograms, breast ultrasounds, interventional procedures and breast MR/interventional procedures.
d. Interpret screening mammograms, diagnostic mammograms, breast ultrasounds and perform interventional procedures. Interpret breast MR and perform breast MR procedures.

2. Education
   a. Introduction workstation is part of the introductory course for first year residents including a hands-on session. Mammographic technique and equipment.
   b. Practical experience in recognizing normal breast anatomy and abnormal findings, as well as management of abnormalities during daily readout of cases with faculty members in a “batch” readout process for screening mammograms and in an “on-line” process for diagnostic mammograms, breast ultrasounds and interventional procedures.
   c. Daily reading assignments depending on cases encountered during the day for mini-presentation and/or discussion the following day.
   d. Residents will participate in the section’s QA evaluations.
   e. During read-out residents will receive direct instructions on how to use multiple information sources to support patient care decisions.
   f. During this rotation senior residents will function as a consultant to referring physicians who call or visit the reading room for radiologic assistance. The consultation will be directly supervised by attending staff.
   g. Systematic review of appropriateness literature (current American College of Radiology appropriateness criteria) in order to develop knowledge of evidence-based indications for mammography, breast ultrasound and MR.

3. Practice Performance Measures
   a. Global faculty Evaluation
   b. 360 Degree Evaluation

4. Medical Knowledge
   a. The resident will learn the performance and interpretation of screening, diagnostic mammograms, ultrasound, and Breast MRI. The resident will learn when to obtain additional studies and what types. The resident will learn about the importance of communicating the results of studies to the referring physician and the patient, using standard BI-RADS terminology and rules.
   b. The resident should learn quality assurance in mammography and gain knowledge of the importance of quality assurance in obtaining diagnostic images. He/she will be expected to comment on quality issues during the fourth week.
   c. The resident will perform and understand the principles of wire localization techniques using imaging guidance as well as needle without vacuum. The resident will perform and understand the principles of stereotactic vacuum assisted biopsy, ultrasound vacuum assisted biopsy and MRI vacuum assisted biopsy. The resident will be responsible for evaluating the concordance or discordance of the results of these biopsies, and for correlating imaging findings with histopathology.
   d. The resident will attend weekly multi-disciplinary conference during all rotations, to understand the role of imaging in diagnosis and follow up of breast cancer patients and present at least once.

5. Practice based Learning and Improvement
a. Perform practice-based improvement in cognitive knowledge, observational skills, synthesizing clinical and imaging data, and formulating an interpretation.

b. Demonstrate knowledge of and apply principles of evidence-based medicine to daily practice.

c. Use multiple sources, including information technology, to support patient care decisions.

d. Demonstrate an ability to distinguish between the quality of various information sources (e.g. informal website versus original research in peer-reviewed journal).

e. Participate in daily QA by identifying images of suboptimal quality that require placement into the departmental QA database.

6. Systems based Practice:
   Definition: Understand how the components of the local and national healthcare system function interdependently and how changes to improve the system involve group and individual efforts. Optimize coordination of patient care both within one’s own practice and within the health care system. Consult with other healthcare professionals, and educate consumers, regarding the most appropriate utilization of imaging resources.

1. Demonstrate knowledge of appropriateness criteria for breast imaging studies.

2. Demonstrate ability to design cost-effective management plans based upon knowledge of best practices.

7. Interpersonal and Communication Skills
   a. Create clear, concise, and informative written radiological reports, including pertinent findings and negatives, BI-RADS with appropriate code included.
   b. Communicate directly with the referring physician about indication for diagnostic study or interventional procedure and if applicable about recommendations for change in the type of examination to be performed.
   c. Communicate directly with the technologist about additional images that should be obtained to identify/characterize pathology and any special patient needs such as allergies to medications, intravenous contrast.
   d. Provide direct communication to referring physicians or appropriate clinical personnel when interpretation reveals an urgent or unexpected finding – all BI-RADS 4 & 5 findings – and document this communication with specifics regarding person contacted, method of contact, and time of contact in the written report.

8. Professionalism
   a. Demonstrate positive work habits, including punctuality and professional appearance.
   b. Demonstrate altruism and compassion towards patients and staff.
   c. Perform responsibilities at the highest level.
   d. Function as an effective team member, including identifying section needs and pitching in to help where needed (e.g. reading cases, interacting with patients and staff, preparing support materials).
   e. Dictate cases and correct transcribed dictations in a timely and accurate fashion, including use of report templates.
   f. Request permission in advance from department regarding requests for time away from the clinical workday.
At the beginning of the rotation, the resident will be presented with the rotation objectives and expectations. The resident will have a mid rotation discussion of his/her performance so far during the rotation. At the end of the rotation, the faculty members of the section will meet and discuss the resident’s performance during the month. The chief of the section or assignee will review the evaluation with the resident near the last day of the rotation. In the unusual case of a substandard performance, this will be brought to the attention of the Residency Program Director and the resident for further counseling.

**Reading Lists**

**1st Rotation**
Required reading includes: ACR BI-RADS lexicon/final assessment, new edition (read first day) and “Breast Imaging Companion”, by Cardenosa, Chapters 1-13 or “Breast Imaging”, by Kopans, Chapters 1-15 with attention to the following topics:

- Breast cancer epidemiology (risk factors, staging, survival rates)
- Mammographic equipment and technique/positioning
- Mammographic quality control
- Normal breast anatomy
- Normal mammographic anatomy/parenchymal patterns
- Mammographic appearance of benign and malignant calcifications
- Mammographic appearance of benign and malignant masses
- Screening theory: lead time/selection bias, prevalence vs. incidence screening, interval cancer rate, etc.


**2nd Rotation**
Residents should review and finish whichever textbook they have chosen (Kopans, Chapters 16-26 or Cardenosa, Chapters 14-18), with attention to the following topics:

- Benign breast diseases: fibroadenoma, cyst, papilloma, hamartoma, lipoma, duct ectasia, radial scar, fat necrosis, phyllodes, hemATOMA
- “Marker lesions”: ADH, ALH, LCIS
- DCIS
- Invasive carcinoma: ductal, lobular, mucinous, medullary, tubular, papillary
- Paget’s disease and inflammatory breast cancer
- Calcifications: sclerosing adenosis, fat necrosis, secretory disease, dermal, dystrophic, fibroadenomas, milk of calcium
- Male breast disease
- The altered breast-pregnancy, lactation, biopsy, mastectomy, radiation treatment, implants.
- Breast cancer treatment
- Interventional procedures

**3rd Rotation and 4th Rotation:**
Review/reread Kopans and Cardenosa, as needed.
“Breast MRI: Diagnosis & Intervention”, Morris.
Supplements and Additional Resources:

**MAMMOGRAPHY**

**Items with 2 stars are required for 3rd Rotation in 4th Year**

1. Mammographic Quality Assurance from A to Z – Dione Faria, et al
2. Probably Benign Breast Lesions: When Should Follow-up Be Recommended and What is the Optimal Follow up Protocol? Edward Sickles
3. Lobular Carcinoma in Situ-Monica Morrow and Stuart Schnitt
11. Digital Mammography – Stephen Feig and Martin Yaffe**
12. The Breast Cancer Screening Controversy and the National Institutes of Health Consensus Development Conference on Breast Cancer Screening for Women Ages 40-49 – Daniel Kopans
15. Mammography with Computer-aided Detection...Reproducibility Assessment: Initial Experience – Bin Zheng et al**

**BREAST ULTRASOUND**

**Items with 2 stars are required for 3rd Rotation in 4th Year**

Sonographic Evaluation of the Breast – Luz Venta, et al

Solid Breast Nodules: Use of Sonography to Distinguish between Benign and Malignant Lesions – Thomas Stavros, et al

Fat Necrosis in the Breast: Sonographic Features – Mary Scott Soo, et al

Current uses of ultrasound in the evaluation of the breast – Tejas Mehta

**INTERVENTIONAL BREAST PROCEDURES**

US-Guided Core Needle Biopsy of the Breast: Technique and Pitfalls – Jennifer Harvey

Ductography: How to and What if? – S. Horatio Slawson

Clinical Management Issues in Percutaneous Core Breast Biopsy – Laura Liberman**
BREAST MRI
High Resolution MR Imaging for Detection, Diagnosis, & staging of Breast Cancer – Susan Orel**

MR Imaging of Breast Implants – Gia DeAngelis, et al

Special Instructions for Rotation:

Vascular/Interventional Goals and Objectives
Submitted by: Dr. Sanders and Dr. Radhakrishnan

- Start time is 7:30 AM
- Review the cases for the following day with appropriate attending. (If not night before, then early AM, at AM rounds.)
- At the end of each day's procedures all cases to be reviewed with an appropriate attending.
- Observe fellows/attendings dictate cases into High-IQ.
- Resident is responsible for placing one interesting case per rotation into department’s digital teaching file.

First Vascular/Interventional Rotation

A. Patient Care
   1. Perform appropriate history and physical and write a complete pre-procedure note.
   2. Take an informed consent from patient for angiography/interventional procedures.
   3. Learn to order and interpret appropriate labs abnormal lab values and correct abnormal lab values.
   4. Learn to adequately assess and follow patients’ post-procedure course.

B. Medical Knowledge
   1. Learn to operate angiography table and controls.
   2. Learn how to set up and use angiography sterile tray.
   3. Learn sterile techniques, including pre-procedure scrub and patient preparation and dressing.
   4. Learn basic anatomy (external and fluoroscopic) for standard procedures.
   5. Learn peripheral venous and arterial access techniques including Seldinger technique.
   7. Learn from the nurses how to operate infusion pumps and how to solve the problems when their alarms indicate a problem.
   8. Learn cardiac and great vessel anatomy so that you can recognize the location of a catheter with respect to the cardiac chambers, tricuspid valve, pulmonary artery and its branches, and the aortic valve and great vessels arising from the aortic arch.
   9. Learn the indications, techniques, and contraindications for image-guided fine needle aspiration biopsy.

C. Interpersonal and Communication General Competency
   1. Learn dictation format.
   2. Notify referring practitioner of results and immediately notify appropriate personnel of complications or poor outcome of procedure or of results requiring emergent care.

D. Professionalism
   3. Demonstrate compassion and respect for the patient, be punctual, have a professional appearance.
   4. Understand patient’s rights including, but not limited to, Informed Consent, Advanced Directives, Do Not Resuscitate Orders, HIPPA and patient privacy, Pain Control, keeping patients draped to minimize patient exposure, appropriate patient clothing and covering during transport, etc.
3. Treat technologists, nurses and other staff with respect and protect them from radiation or biological hazards.
4. Teach patients about their conditions and care

E. Practice Based Learning and Improvement
3. Review the studies and interpretation of procedures performed by other members of the department during your rotation.
4. Watch and study the technique used by more experienced radiologists during your rotation to learn from them.
5. Review any complications or poor outcomes that occurred in the division during your rotation to learn the root cause of the problem and develop and implement mechanisms to avoid the complications or poor outcomes in the future.

F. Systems Based Practice
2. As per hospital policy: Confirm that you have the correct patient with two identifiers before starting a procedure. Confirm that you are about to perform procedure on the correct side before starting procedure.
3. Use hospital information system to obtain laboratory data needed prior to study.
4. Ensure that the personnel caring for the patients on the clinical units are aware of special orders or other preparation needed prior to study e.g. infusing platelets. As per hospital policy: For telephone orders, have appropriate personnel write down orders and read it back to you.
5. Be certain that arrangements have been made to have patient transported to the special procedures suite.
6. Be sure that outpatients have necessary insurance authorization.
7. Be certain that the personnel caring for the patients on clinical units are aware of needed follow-up care. As per hospital policy: For telephone orders, have appropriate personnel write down orders and read it back to you.
8. Maintain procedure log of all procedures in which you participated in the performance, interpretation, and reporting of the procedure for accreditation, credentialing, evaluation and possible program improvement. Record the medical record number, date, type of procedure, supervising radiology attending, and any complication.
9. Understand the role of the Institutional Ethics Committee to help patients and family and staff resolve ethical dilemmas.

Assessment tools of Resident Performance
1. Review of Interventional Radiology Faculty and end-of-rotation resident evaluation form.
2. “360° degree” evaluation by nursing staff
3. ACR In-service examination results in Interventional Radiology
4. Self assessment tool: time and number of attempts needed to obtain successful access of vessels.

Second Vascular/Interventional Rotation

A. Review and Continue to Improve Upon the Goals and Objectives for the First Rotation
B. Patient Care
1. Refine pre-procedure work-up and post-procedure care.
2. Interact more with referring physicians on initial consultation and follow ups.
C. Medical Knowledge
1. Learn selective catheterization techniques.
2. Learn various catheter shapes and sizes available.
3. Learn various wire shapes, sizes and consistency available.
4. Learn relatively common vascular anatomy variants
5. Learn cardiac and great vessel physiology so that you can recognize the pressure tracings obtained from the pulmonary catheter when it is located in the cardiac chambers and pulmonary artery and its branches and their significance during the procedure. It is optional but recommended that you renew your Advanced Cardiac Life Support certification. It is required that you maintain Basic Life Support certification.
6. Learn the variants in the anatomy of the great vessels of the aortic arch.
7. Perform image-guided fine needle aspiration biopsy.
8. Learn the indications, contraindications and techniques or abscess or fluid collection drainage.

D. Interpersonal and Communication General Competency
   1. Notify referring practitioner of results and immediately notify appropriate personnel of complications or poor outcome of procedure or of results requiring emergent care.

F. Professionalism
   1. Teach Medical Students and more junior radiology residents about Interventional Radiology topics.

E. Practice Based Learning and Improvement
   1. Attend intradepartmental conferences that meet with the Interventional Radiology faculty to learn form our practice’s experience
   2. Consider involvement in ongoing research project or publication with faculty and possibly also with interventional radiology fellows and interested medical students.
   3. Consider planning and starting a new research project or publication with faculty and possibly also with interventional radiology fellows and interested medical students.

F. Systems Based Practice
   1. Regarding research or publication projects, Understand the requirements and procedures for Institutional Review Board approval of research.
   2. Be aware of the American College of Radiology Appropriateness criteria and Practice Guidelines and Technical Standards for interventional radiology (www.acr.org)

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Third Vascular/Interventional Rotation

A. Review and Continue to Improve Upon the Goals and Objectives for the First Rotation

B. Patient Care
   1. Knowledge of catheter maintenance and follow-up care (includes dressing changes, flushing, input and output, when to change and remove.

C. Medical Knowledge
   1. Be able to complete basic diagnostic angiogram as primary operator.
   2. Be able to complete key components of interventional procedures as primary operator.
   3. Review cardiac arrhythmias, their physiologies and their appearances on cardiac monitors and the emergent treatments of serious arrhythmias. It is optional but recommended that you renew your Advanced Cardiac Life Support certification. It is required that you maintain Basic Life Support certification.
   4. Understand the pathologic basis of various disease entities and how that correlates with their angiographic appearance.
   5. Develop more confidence in performing image-guided fine needle aspiration biopsy.
   6. Perform abscess or fluid collection drainage.

D. Interpersonal and Communication General Competency
1. Take an active role in presenting interesting interventional radiology cases in conferences to other radiologists and when appropriate to members of other departments.

E. Professionalism
   1. Teach nursing staff, other Interventional Radiology staff, and residents from other departments as well as medical students and more junior radiology residents about topics in interventional radiology.

F. Systems Based Practice
   1. Regarding research or publication projects, Understand the requirements and procedures for Institutional Review Board approval of research.
   2. Be aware of Society of Interventional Radiology (www.sirweb.org) resources including its online Clinical Practice Guidelines, Quality Improvements Documents, Consensus Documents, Credentialing Statements, Policy and Position Statements, Technical Assessment Documents, Coding information, etc.

Georgia Health Sciences University
Angiography and Interventional Radiology
Curriculum
ANGIOGRAPHY AND INTERVENTIONAL RADIOLOGY

Concept Block 1
A. Introduction To Vascular and Interventional Radiology
B. On Call Resident Responsibilities
   • Pre-procedure Assessment and Care
   • Consent
   • Intra-procedure Monitoring
   • Post-procedure Follow-up and Care
C. Laboratory Results
   • Correction of Abnormal Labs
D. General Pharmacologic Considerations
   • Analgesia/Anesthesia
   • Conscious Sedation
   • Antibiotic Treatment
   • Anticoagulation
   • Renal Insufficiency
   • Contrast Allergies
   • - Premedication
   • Other
E. Imaging of the Vascular System
   • Plain Film
   • Angiography
   • Contrast Agents
   • Iodinated
   • CO2
   • Gadolinium
   • Vascular Catheterization
   • Risks/Complications
   • Ultrasound
   • Doppler
   • Intravascular Ultrasound
   • CT
   • CT Angio
   • MRI/MRA
• Nuclear Medicine
• Tour of Angiography Section and Suite

Concept Block 2
A. History of C.V. and I.R.
B. Educational Issues
• Training/Credentialing
• CME
• Research
C. Legal/Political Aspects
• Consent
• Regulatory Agencies
D. Economic Aspects
• Coding
• Equipment Purchase
• Inventory
F. Q.A.
• Complications
G. Workplace
• Angiography Suite
• Recovery
• Safety Issues
• Radiation Safety
• Infection Control
H. Personnel Considerations
• Nurses, Techs, Trainees, Medical Students, Other MDs
• In-Service, Education

VASCULAR DIAGNOSIS
ARTERIAL AND VENOUS
(GENERAL)
A. Clinical/Lab Considerations
• Symptoms
• Non-invasive Imaging
• Epidemiology
B. Vascular Anatomy
C. Vascular Physiology, Pathology
• Histology
• Hemodynamics
• Vasoactive Agents
• Atherosclerosis
• Medial Sclerosis
• Aneurysms
• Thromboembolic Disorders
• Dissection
• Congenital Vascular Disorders
• Infection
• Vascular Alterations in Neoplasm
• Systemic Vascular Disorders
• Vascular Trauma

VASCULAR DIAGNOSIS
VENOUS
(SPECIFIC)
A. Lower Extremity
   • DVT (acute and chronic)
   • Vascular Malformation
B. Upper Extremity
   • Venous Thrombosis (acute and chronic)
C. Central Venous Disorders
   • SVC/Pelvic/IVC

VASCULAR DIAGNOSIS
VENOUS
(SPECIFIC)
• Pulmonary Angiography
• Contraindication
• Risks
• Hemodynamics
• Thromboembolic Diagnosis
• AVM

VASCULAR DIAGNOSIS AND TREATMENT
(VENOUS)
A. Portal Anatomy
   • Arterial Portography
   • Splenoportography
   • Direct Portography
B. Hepatic-Venography
   • Wedge (balloon occlusion)
C. Pressure Measurements
D. Budd Chiari
E. Portal HTN
   • Causes
   • Collaterals
   • Varices
F. TIPS
   • Preprocedure Assessment
   • Procedure
   • Post-procedure
   • Follow-up
   • Secondary Patency

VASCULAR DIAGNOSIS
(ARTERIAL)
A. Thoracic Aorta
   • Anatomy
   • Intercostals
   • Bronchial
   • Congenital Variants
   • Atherosclerosis
   • Aneurysm Disease
   • Dissection
   • Classifications
   • Trauma
   • Aortic Disruption
B. Upper Extremity
   • Anatomy
• Collaterals
• Atherosclerosis
• Steal Syndromes
• Thoracic Outlet Syndromes
• Thromboembolism
• Vasospastic Disorder
• Trauma

VASCULAR DIAGNOSIS
A. Abdominal Aorta and Pelvis
  • Anatomy
  • Atherosclerosis
  • Occlusive Disease
  • Dissection
  • Aneurysms
  • Trauma
  • Vascular Malformations
  • Vasculogenic Impotence

VASCULAR DIAGNOSIS (ARTERIAL)
  Lower Extremities
B. Anatomy
  • Anatomic Variants
  • Collateral Circulation
C. Aneurysm
D. Occlusive Disease
  • Atherosclerosis
  • Thromboangiitis Obliterans
  • Thromboembolic Occlusive
  • Atheroma/Cholesterol Emboli
E. Trauma
F. Vasospastic Disorders
  • Drug Induced
  • Post-Traumatic
  • Raynards
G. Miscellaneous
  • AVM
  • Hemangioma
  • Klippel-Trenaunay-Weber
  • Adventitial Cystic Disease
  • Popliteal Entrapment
H. Post Surgery

VASCULAR INTERVENTION
A. Recanalization
B. Thrombolytic Therapy
  • Pharmacologic Agents
  • Mechanical Technique
  • Balloon Angioplasty/Vascular Stents
  • Miscellaneous
C. Embolization
  • Techniques
  • Agents
D. Venous Intervention
E. DVT
   • PE
   • Foreign Body Removal
   • Fibrin Sheath Stripping
   • Catheter Repositioning
F. Hemodialysis Grafts/Fistulas
G. Venous Access

VASCULAR DIAGNOSIS
(ARTERIAL)
A. Visceral Angiography (Esophago – Gastrointestinal, Liver, Spleen, Pancreas)
   • Anatomy
   • Collaterals
   • Variants
   • Celiac Artery Compression
   • Mesenteric Ischemia
   • Papaverine
   • Tumors
   • Benign
   • Malignant
   • GI Bleeding
   • Fistulae
   • Inflammatory Diseases
   • Atherosclerosis
   • Embolic Occlusive Disease
   • FMD
   • Arteritis
   • Trauma
B. Renal
   • Tumors
   • Benign
   • Malignant
   • Fistulae
   • Atherosclerosis
   • Embolic Occlusive Disease
   • FMD
   • Arteritis
   • Polyarteritis Nodosa
   • Trauma

VASCULAR INTERVENTION
A. Recanalization
B. Thrombolytic Therapy
   • Pharmacologic
   • History
   • Agents
   • Contraindications
   • Mechanical
   • Fogarty
   • Suction
   • New Devices
• Angioplasty/Stents
• History
• Catheters/Stents
• Techniques
• Post Procedure Care
• Complications
• Troubleshooting
• Success
• Miscellaneous
• Atherectomy
• Mechanical Thromboectomy
• Laser
• Endovascular Stent/Grafts
• Arterial
• Venous
C. Embolization
  • History
  • Agents
  • Techniques
  • Anatomical Considerations
  • Specific Cases (including but not exclusively)
  • GI Bleeding
  • Trauma
  • Tumor
  • Varicocele
  • Uterine Artery Fibroids
  • Postpartum Bleeding
D. Venous Intervention
E. DVT
  • Anticoagulation
  • Thrombolytic Treatment
  • Filters
  • PE
  • Anticoagulation
  • Thrombolytic Treatment
  • Thrombectomy
F. Hemodialysis (Grafts/Fistulas)
  • Monitoring
  • Diagnosis
  • Recanalization
  • Thrombolytic Therapy
  • Mechanical Thrombectomy
VASCULAR INTERVENTION
Venous Access
A. Patient Selection
B. Risks/Benefits
C. Patency Rates
  • PICC lines
  • Quinton Catheters (non-tunneled central lines)
  • Pass Port
  • Port-a-cath
• Perm-a-cath (tunneled central lines and catheters)

Non-Vascular Intervention
A. Biliary Intervention
• PTC
• Biliary Intervention
• -PTC
• -Biliary Obstruction
  o Malignant
  o Benign
  o Drainage
  o Stenting
• Percutaneous Cholecystostomy
• -Acalculous Cholecystitis
• -Calculous Choledochitis
• Treatment of Biliary Calculi
• Brush Biopsies
B. Gastrointestinal Intervention
• Percutaneous G-tube
• Percutaneous G-J tube
• GI Strictures
• GI Foreign Body Retrieval
C. Genitourinary Intervention
• Renal Obstruction
• Antegrade pyelography and percutaneous nephrostomy
• Whitaker Test
• Nephroureteral stenting
• Strictures
• Calculi
• Percutaneous Nephrolithotomy
• Urinary Leaks/Fistulas
• Urinary Diversions
• Bladder
• Urethra
• Strictures
• Male Specific
• Female Specific
• Fallopian tube recanalization
D. Biopsies/Aspiration
• Thoracic
• Lung
• Mediastinum
• Pleura
• Cervical
• Abdominal
• Liver
• Pancreas
• Spleen
• Adrenals
• GU
• GI
• Peritoneum
E. Abscess Drainage
• Chest
  o Thoracentesis
  o Chest Tube Placement and Management
  o Pleural Collections
  o PTX
  o Emphysema
  o Hemothorax
  o Fibrinolytics
  o Malignant
• Abdomen/Pelvis
  o Peritoneal
  o Paracentesis
  o Retroperitoneal
  o GU
  o Renal Abscess
  o Renal Cyst
  o Ablation
  o Liver
  o Pancreas
  o Types of collections
  o Pancreatic inflammatory disease
  o Lymphoceles
  o Ablation

All topics under Non-Vascular items will include or be introduced with:
• Patient Care
• Clinical and Lab considerations
• Natural History
• Imaging
• Anatomic Considerations
• Physiology/Pathophysiology
• Procedural Aspects

Resident Participation in
Angiography and Interventional Radiology
at Georgia Health Sciences University

Suggested Reading List:
• First Years for Practicum:

Introductory Rotation
Clinical Skills
By the end of the Introductory rotation, the resident should be able to:

A. Perform a directed history and physical (H&P) examination
B. Concisely document the H&P in the form of a consultation
C. Present the H&P in a logical, concise fashion
D. Obtain written consent, which requires an understanding of complications and success rates associated with a variety of procedures
E. Write the necessary pre- and post-procedure orders pertaining to each procedure
F. Premedicate patients with contrast allergy
G. Follow and document progress of patients after VIR procedures
H. Perform a complete vascular physical examination, including Doppler interrogation of blood vessels and measurement of ankle-brachial indices

Technical Skills
By the end of the introductory rotation, the resident should be able to:
A. Use Seldinger technique to obtain non-selective arterial access in normal and minimally diseased arteries
B. Use Seldinger technique to obtain non-selective venous access
C. Discuss injection and filming procedures for non-selective vascular diagnostic examinations
D. Use ultrasound guidance (freehand) to obtain vascular access to veins
E. Perform basic drainage technique (eg large abscess)
F. Use basic guide wire exchange techniques
G. Administer local anesthesia
H. Prescribe and monitor the use of conscious sedation
I. Place a non-tunneled right internal jugular vein catheter using US guidance in a virgin vein
J. Use appropriate suture technique

Cognitive Skills
By the end of the introductory rotation, the resident should be able to:
A. Discuss risks, benefits, indications, and contraindications of VIR procedures.
B. Discuss dosing and reversal of conscious sedation
C. Discuss the drugs used in VIR procedures including analgesics, anti-anxiety agents, spasmyloytic drugs, thrombolytic agents, and antibiotics
D. Review basics of iodinated contrast, including alternatives to standard agents
E. Outline arterial and venous anatomy, including collateral routes, particularly in the visceral, peripheral, renal and supra aortic circulation
F. Recognize common vascular normal variants
G. Define basic biliary and genitourinary anatomy
H. Discuss pathophysiology of peripheral vascular disease, renovascular hypertension, carotid occlusive disease, venous thromboembolic disease, biliary and genitourinary obstruction and abscesses

Reading list
A. SIR Syllabus Series
   Patient Care in Interventional Radiology
   Peripheral Vascular Interventions, 2nd ed.
C. Valji, Vascular and Interventional Radiology, Saunders
E. Murphy, Interventional Radiology Secrets, 1st ed. Lippincott Williams & Wilkins, to be published 10/2002

Reference:
Advanced Rotation

In addition to reviewing and refreshing the material outlined above:

Clinical Skills:
By the end of the Advanced rotation, the resident should be able to:
A. Perform evaluation (H&P, consult, preparation) of complex VIR patients (such as those requiring TIPS)
B. Perform a complete H&P and admit and discharge patients as needed
C. Direct care of patients with complex disease
D. Recognize situations in which senior (fellow, staff) assistance is required

Technical Skills:
By the end of the Advanced rotation, the resident should be able to:
A. Perform selective vascular catheterization (first order)
B. Perform percutaneous needle access to bile ducts, collecting system for diagnostic purposes
C. Plan and perform CT guided drainage procedures
D. Perform diagnostic dialysis fistulography
E. Place a non-tunneled right internal jugular vein catheter in most patients

Cognitive Skills:
By the end of the Advanced rotation, the resident should be able to:
A. Discuss indications, basic technique, tools, results, complications and outcomes of percutaneous transluminal angioplasty of arteries and veins
B. Discuss use of vascular stents
C. Review basic principles of thrombolysis
D. Discuss percutaneous biliary and urinary drainage, including strategies for internal drainage using stents
E. Outline the TIPS procedure
F. Review the roles of thrombolysis and PTA in dialysis access
G. Discuss principles of venous access including PICCs, tunneled catheters and dialysis catheters
H. Review basic principles of MRA and CTA
I. Discuss indications for and contraindications to inferior vena caval filter placement, as well as advantages and disadvantages of various available filters

Reading:
A. SIR Syllabus Series
   Biliary Interventions
   Noninvasive Vascular Imaging with US, CT and MR
   Portal Hypertension, 2nd ed.
   Thoracic and Visceral Vascular Interventions
   Venous Interventions
OVERVIEW

SECTION I: GENERAL TOPICS IN CARDIOVASCULAR AND INTERVENTIONAL RADIOLOGY

Included in this section are the historical aspects of the subspecialty as well as various general practice considerations: legal, political, economic, training, and workplace issues.

SECTION II: PATIENT CARE

This section includes general aspects of patient care; its topics are in turn included, as appropriate, as they relate to more specific sections of the outline which follows.

SECTION III: VASCULAR DIAGNOSIS

This section starts with a list of “common” topics—radiological and non-radiological aspects of vascular diagnosis—which, in turn, are included as they relate to more specific sections. The specific sections are divided primarily by anatomic regions, and then by organs or organ systems. Although most of the section relates to the circulatory system, the lymphatic system is also included as a special topic.

SECTION IV: VASCULAR INTERVENTION

This section starts with a broad overview of major categories of vascular intervention which, in turn, are included as they relate to more specific sections. The specific sections are then divided primarily by anatomic regions and then by organs or organ systems.

SECTION V: NONVASCULAR INTERVENTION

This section starts with a list of “common” topics—radiological and non-radiological aspects of non vascular intervention—which, in turn, are included as they relate to more specific sections. The specific sections are divided into traditional subsections which relate primarily to organs or organ systems.

SECTION I: GENERAL TOPICS IN CARDIOVASCULAR AND INTERVENTIONAL RADIOLOGY

- History of Cardiovascular and Interventional Radiology
- Educational Issues
- Training and credentialing
- Continuing education
- Research in Vascular and Interventional Radiology
  - Guidelines for research projects
  - Biostatistics
  - Grants/funding options
• Legal and Political Aspects of Cardiovascular and Interventional Radiology
  o Informed consent
  o Malpractice
• Regulatory agencies
  o Investigational devices and procedures
  o Organized medicine
  o Business/Economic Aspects
  o CPT coding and related issues
  o Equipment purchase
  o Inventory management
  o Capitation
• Quality Assurance Issues
  o Outcomes analysis
  o Practice guidelines
  o Complications: classification, documentation
• Workplace considerations
  o The vascular/interventional radiology suite
  o Equipment
  o Fluoroscopy
  o Standard angiography
  o Digital angiography
  o Image processing and recording
  o Other equipment (e.g. interventional ultrasound units)
  o Layout
  o Recovery room
  o Noninvasive vascular laboratory
  o Equipment
  o Management
  o Occupational Safety Issues
  o Radiation safety and hygiene
  o Infection control
  o Other
• Personnel Considerations
  o The vascular/interventional radiology “team”: role and relationship of nurses, technologists, trainees, other physicians
  o Inservice/continuing education

SECTION II:
PATIENT ARE IN VASCULAR AND INTERVENTIONAL RADIOLOGY
* These topics stand alone as general subjects, but are also assumed to be included as appropriate under subheadings of Sections III-V of the outline.
• Pre-procedural assessment and care
• Intraprocedural monitoring
• Post-procedural followup and care
• General pharmacologic considerations
  o Analgesia/anesthesia
  o Conscious sedation
  o Antibiotic therapy
  o Anticoagulation
  o Other

SECTION III:
VASCULAR DIAGNOSIS
PART I: Common topics

- Although many of these topics can be discussed in a general sense, they are also applicable to the more specific subjects of Section III, Part II and can be assumed to be subheadings of these specific subjects, where appropriate.
- Patient Care (see Section II)
- Clinical and Laboratory Considerations
  - Symptomatology and staging of vascular disease
  - Laboratory data (including non-imaging aspects of noninvasive vascular testing; for example, ankle-brachial indices for lower extremity arterial disease, impedance plethysmography for lower extremity venous disease)
  - Epidemiology of vascular disease
  - Natural history of vascular disorders
  - Vascular anatomy: arterial and venous
    - Embryology
    - Normal anatomy
    - Variant anatomy
    - Anatomy of collateral pathways
- Vascular physiology, pathology and pathophysiology: arterial system
  - Normal histology/physiology/morphology
  - Hemodynamics: normal and abnormal flow
  - Vasoactive extrinsic/pharmacologic agents
  - Normal response
  - Disorders related to pharmacologic/extrinsic agent exposure
- Atherosclerosis
- Medial sclerosis
- Pathophysiology of arterial ischemia
- Aneurysms
- Thromboembolic disorders
- Dissection
- Congenital vascular disorders
  - Vascular malformations
  - Other congenital disorders (for example, popliteal artery entrapment in the case of lower extremity vascular disorders)
- Arterial effects of adjacent tissues/disorders
- Arterial infection
- Vascular alterations in neoplasia: vascular supply of neoplasms, primary vascular neoplasms, vascular invasion by neoplasms
- Vascular alterations in inflammatory diseases
- Systemic vascular disorders
  - Primary systemic vascular disorders: vasculitides and others (polyarteritis nodosa, Takayasu’s arteritis, giant cell arteritis, Buerger’s disease)
  - Altered vascular pathology in systemic disease states (for example, in diabetes mellitus, collagen vascular disease, Behçet’s disease, etc.)
- Vascular trauma: injuries and vascular response to injury
  - Mechanical injury: acute and chronic
  - Thermal injury
- Arterial endothelium
- Alterations in coagulation status
  - Hypercoagulable states
  - Impaired coagulation
• Post-operative or post-interventional disorders
  o Synthetic and endogenous grafts
  o Myointimal hyperplasia
• Other/unclassified
• Vascular physiology, pathology and pathophysiology: venous/pulmonary arterial system
• Normal histology/physiology/morphology
• Hemodynamics: normal and abnormal flow
• Vasoactive extrinsic/pharmacologic agents
  o Normal response
  o Disorders related to pharmacologic/extrinsic agent exposure
• Thromboembolic disorders: acute and chronic
• Venous aneurysms
• Venous effects of adjacent tissues/disorders
• Congenital vascular disorders
  o Vascular malformations
  o Other congenital disorders
• Venous infection
• Vascular alterations in neoplasia: vascular drainage of neoplasms, primary vascular neoplasms, vascular invasion by neoplasms
• Vascular alterations in inflammatory diseases
• Systemic vascular disorders
  o Primary systemic vascular disorders
• Altered vascular pathology in systemic disease states
• Vascular trauma: injuries and vascular response to injury
  o Mechanical injury--acute and chronic
  o Thermal injury
• Venous endothelium
• Alterations in coagulation status
  o Hypercoagulable states
  o Impaired coagulation
• Post-operative or post-interventional disorders
  o Synthetic and endogenous grafts
  o Intimal hyperplasia
• Other/unclassified

Imaging of the vascular system: general principles
• Plain film
• Angiography: arteriography and venography
  o Standard angiography
  o Digital subtraction angiography
  o Contrast agents
    ▪ Iodinated agents
    ▪ Carbon dioxide
• Vascular catheterization
  o Equipment: needles, guidewires, catheters, etc.
  o Vascular access
  o Selective and subselective catheterization
• Risks and complications
  o Contrast reactions, iodinated agents
    ▪ Anaphylactoid reactions
      ❖ Classification
PART I: General Considerations
• Prevention
  ➢ Ionic vs. nonionic agents
  ➢ Premedication
• Treatment
  ▪ Dose dependent reactions
  ▪ Classification
    ➢ Acute and chronic renal effects
    ➢ Other
• Prevention
• Treatment
  ▪ Procedural complications
  ▪ Puncture site complications
  ▪ Catheterization-related complications (apart from puncture site)
  ▪ Systemic/generalized complications
• Pharmacoangiography: agents and uses
  ▪ Vasodilatation
  ▪ Vasoconstriction
  ▪ Other
• Ultrasonography
  ▪ Gray scale
  ▪ Duplex Doppler
  ▪ Color flow
  ▪ Intravascular ultrasound
• Computed Tomography
  ▪ General
  ▪ Spiral and Cine CT
  ▪ CT angiography
• Magnetic Resonance Imaging
  ▪ General
  ▪ Blood flow evaluation and MR angiography
• Nuclear medicine
• Angioscopy

PART II: Specific Topics
* The topics listed in Part I should be considered subheadings of the following. However, areas of particular importance are listed specifically.
  • Lower extremity vascular disease
    ▪ Arterial
      ▫ Peripheral atherosclerotic arterial disease
      ▫ Lower extremity aneurysms (iliac, femoral, popliteal, other)
      ▫ Nonatherosclerotic peripheral vascular disease (popliteal entrapment, adventitial cystic disease
      ▫ Iatrogenic disorders: puncture site complications
      ▫ Trauma
  • Venous
    ▪ Acute deep venous thrombosis
    ▪ Chronic deep venous thrombosis/venous insufficiency
  • Combined: vascular malformations
  • Upper extremity vascular disease
    ▪ Arterial
      ▫ Thoracic outlet syndrome
- Atherosclerosis
- Vasculitis, Raynaud’s disease and phenomenon
- Trauma

- Venous
  - Acute upper extremity venous thrombosis
  - Chronic upper extremity venous thrombosis

- Combined: vascular malformations

- Thoracic vascular disease
  - Hemoptysis and its evaluation
  - Pulmonary arteries and veins
    - Pulmonary artery hemodynamics (as related to pulmonary angiography)
    - Pulmonary thromboembolic disease
    - Pulmonary arteriovenous malformations
    - Pulmonary venous disorders

- Aortic disorders
  - Aortic aneurysm
  - Aortic dissection
  - Aortic trauma
  - Congenital disorders
  - Vasculitides affecting the aorta
  - Post-operative aorta

- Central venous disorders (SVC, IVC)
  - Central venous occlusive disorders

- Vascular diagnosis, abdominal and pelvic viscera
  - Genitourinary system
    - Kidney
      - Renovascular hypertension: causes, workup, including noninvasive imaging, renin-angiotensin system and renin ampling, arteriography
      - Renal trauma
      - Renal neoplasms

- Ureters/bladder
  - Prostate
  - Testes/scrotum
  - Vasogenic impotence in men
  - Uterus
    - Gynecologic hemorrhagic disorders
  - Ovaries

- Gastrointestinal Tract
  - Gastrointestinal hemorrhage
    - Workup considerations: angiography vs. endoscopy vs. nuclear medicine
    - Specific causes
      - Gastritis
      - Peptic ulcer disease
      - Mallory-Weiss tear
      - Hepatobiliary: hemobilia
      - Neoplasms
      - Angiodysplasia
      - Diverticulitis
      - Vascular malformations
      - Venous bleeding (see also section on portal hypertension)
        - Other
• Angiographic evaluation
  • Mesenteric ischemia
    o Acute mesenteric ischemia
      ▪ Embolic
      ▪ Thrombotic
      ▪ Nonocclusive
      ▪ Mesenteric venous ischemia
      ▪ Other
        ▶ Chronic mesenteric ischemia/mesenteric atherosclerosis
    o Mesenteric aneurysms
  • Portal/hepatic vascular disorders
    o Portal hypertension
      ▪ General imaging evaluation
      ▪ Angiographic evaluation: arterial portography, splenoportography, direct portography, hepatic venography, wedge (or balloon occlusion) hepatic venography and pressure measurements
      ▪ Classification
    o Budd-Chiari syndrome and other forms of hepatic venous outflow obstruction
    o Hepatic neoplasms: primary and secondary
    o Pancreas
    o Vascular manifestations of pancreatic inflammatory disease
    o Pancreatic neoplasms
      ▪ Evaluation for resectability
      ▪ Detection of islet cell tumors
        ▶ Arteriography
        ▶ Venous sampling
  • Spleen
    o Splenic trauma
  • Adrenal glands
    o Arteriographic and venographic evaluation of neoplasms (including risks in setting of pheochromocytoma)
  • Cardiac/coronary vasculature
    o Congenital heart and great vessel disease
    o Coronary artery disease
    o Acquired non coronary heart disease
      ▪ Valvular
      ▪ Endocardial
      ▪ Myocardial
      ▪ Pericardial
  • Neuroangiography
    o Atherosclerotic cerebral vascular disease
    o Aneurysms
    o Vascular malformations
  • Vascular aspects of endocrine disorders
    o Clinical aspects
    o Venous sampling
      ▪ Indications
      ▪ Techniques
  • Specific sites
    o Thyroid/parathyroid
    o Adrenal
• Pancreas
• Ovarian

• Postsurgical conditions
  • Arterial and venous bypass procedures
  • Grafts for aneurysms
  • Grafts for dissection
  • Dialysis access procedures and disorders

• Vascular aspects of organ transplantation
  • Liver
  • Kidney
  • Pancreas
  • Small bowel
  • Heart
  • Lung

• Lymphatic system
  • Anatomy

• Lymphangiography
  • Performance
  • Interpretation
  • Indications and contraindications
  • Risks
    • Other methods of evaluation
    • Physiology, pathology, pathophysiology

• Pediatric vascular diagnosis (see the general topics parts I and II of this section; although clear differences exist in vascular diagnostic considerations between pediatric and adult age groups, a detailed outline is not provided here)

SECTION IV:
VASCULAR INTERVENTION
PART I: Common Topics and Major Categories, Vascular Intervention
* Although many of these topics can be discussed in a general sense, they are also applicable to the more specific subjects of Section IV, Part II and can be assumed to be subheadings of these specific subjects., where appropriate.

• Patient Care (see Section II)

• Common Topics: vascular interventional procedures
  • Anatomic considerations
  • Indications and contraindications
  • Techniques, devices, materials
  • Results, efficacy
  • Risks and complications
  • Alternate techniques (surgical and medical therapeutic options)

• Vascular canalization/recanalization: re-establishment of flow
  • Thrombolytic therapy
    • Pharmacologic thrombolysis
      • General principles
      • Specific agents: urokinase, streptokinase, tissue plasminogen activator, others
    • Mechanical techniques
      • Fogarty balloon
      • Suction thromboembolectomy
      • Other/newer devices
  • Balloon angioplasty
• Atherectomy
• Laser recanalization
• Mechanical recanalization
• Vascular stents
• Endovascular grafts
• Other
• Vascular blockade: obliteration of flow
  • Embolization
  • Techniques
    ▪ Transcatheter
    ▪ Direct injection
      ❖ Agents
  • Other methods
    ▪ Ultrasound guided compression repair
• Infusional therapy
  • Flow diminution
  • Flow enhancement
• Re-routing of flow
  • Endovascular repair of aneurysms
  • Creation of new vascular channels (e.g. TIPS, fenestration of aortic dissection)
• Vascular filters
• Vascular foreign body removal
• Intravascular/transvascular biopsy
  • Transvenous liver biopsy
  • Other

PART II: Specific Topics
* The topics listed in Part I should be considered subheadings of the following. However, areas of particular importance are listed specifically.
• Lower extremity vascular disease
  • Arterial
    ▪ Occlusive atherosclerotic disease: recanalization
      ❖ Aortoiliac
      ❖ Femoropopliteal
      ❖ Tibioperoneal
    ▪ Intervention for peripheral arterial trauma
    ▪ Thromboembolic disorders: recanalization
    ▪ Peripheral arterial graft failure: recanalization
    ▪ Iatrogenic disorders: therapy for puncture site complications
  • Venous
  • Combined: vascular malformations: obliteration
• Upper extremity vascular disease
  • Arterial
    ▪ Thromboembolic disorders: recanalization
    ▪ Trauma
  • Venous
    ▪ Acute upper extremity venous thrombosis: recanalization
    ▪ Chronic upper extremity venous thrombosis: recanalization
  • Combined: vascular malformations: obliteration
• Thoracic vascular disease
  • Hemoptysis
  • Bronchial embolization
Other techniques
- Pulmonary arteries and veins
  - Pulmonary thromboembolic disease: thrombolytic therapy, thromboembolectomy
  - Pulmonary arteriovenous malformations: embolization

- Aortic disorders
  - Aortic aneurysm: embolization, endovascular grafting
  - Aortic dissection: endovascular grafting, fenestration
  - Aortic trauma

- Central venous intervention (SVC, IVC)
  - Central venous occlusive disorders
    - Thromboembolic disorders
    - Congenital webs
  - Indwelling central venous access
  - Caval filtration and related techniques for thromboembolic disease

- Vascular diagnosis, abdominal and pelvic viscera
  - Genitourinary system
    - Kidney
      - Renovascular hypertension: recanalization techniques
      - Renal trauma
      - Renal neoplasms
      - Renal ablation
    - Uterus: Treatment of gynecologic hemorrhage
    - Interventional techniques in treatment of vasogenic impotence
    - Varicoceles
  - Gastrointestinal Tract
    - Gastrointestinal hemorrhage
      - Embolization vs. infusional therapy (vasopressin)
      - Specific sites
        - Upper GI (esophago-gastro-duodenal)
        - Small bowel
        - Colonic
    - Mesenteric ischemia
      - Acute mesenteric ischemia
        - Infusional therapy: vasodilators
      - Thromboembolic disease: thrombolytic therapy
    - Chronic mesenteric ischemia/mesenteric atherosclerosis
      - Recanalization techniques: angioplasty, stents, etc.
      - Mesenteric aneurysms/pseudoaneurysms
  - Portal/hepatic vascular disorders
    - Portal hypertension
    - Variceal bleeding: embolization and infusional therapy
    - Transjugular intrahepatic portosystemic shunt-stent (TIPS)
    - Budd-Chiari syndrome and other forms of hepatic venous outflow obstruction
    - Hepatic neoplasms: infusional therapy and chemoembolization
  - Pancreas
    - Therapy for vascular manifestations of pancreatic inflammatory disease
  - Spleen
    - Vascular intervention for splenic trauma
    - Treatment of hypersplenism

- Cardiac/coronary vasculature
  - Congenital heart disease
Coronary artery disease
Valvular disease
• Neurovascular intervention
  o Chronic cerebrovascular occlusive disease
    ▪ Atherosclerotic
    ▪ Other
  o Neurovascular intervention in stroke
  o Aneurysms
  o Vascular malformations
  o Neoplasms
• Intravascular tumor therapy
  o Infusional therapy
  o Chemoembolization
• Vascular intervention in organ transplantation
  o Liver
  o Kidney
  o Pancreas
  o Small bowel
  o Heart
  o Lung
• Dialysis access intervention: recanalization techniques
• Congenital disorders: Principles and practice of interventional management of Arteriovenous malformations
• Pediatric vascular intervention (see the general topics parts I and II of this Section; although clear differences exist in types and frequencies of procedures between pediatric and adult age groups, a detailed outline is not provided here)

SECTION V:
NON VASCULAR INTERVENTION
PART I: Common topics
* Although many of these topics can be discussed in a general sense, they are also applicable to the more specific subjects of Section V, Part II and can be assumed to be subheadings of these specific subjects, where appropriate.
  • Patient Care (see Section II): note that “tube management” plays a large role in many nonvascular interventions
  • Clinical and Laboratory Considerations
    o Symptomatology and staging of nonvascular disorders
    o Laboratory data
    o Epidemiology
  • Natural history
  • Imaging
    o Plain film
    o Endoluminal contrast studies: gastrointestinal tract, cholangiographic techniques
    o Intravascular contrast studies (intravenous urography, cholangiographic techniques)
    o Direct injection of contrast (percutaneous cholangiography, antegrade nephrostograms, retrograde ureteropyelography)
    o Ultrasonography
    o Computed tomography
    o Magnetic resonance imaging
    o Nuclear medicine
    o Endoscopic techniques
      ▪ Gastrointestinal endoscopy
• ERCP
• Biliary endoscopy
• Genitourinary endoscopy: antegrade, retrograde

• Anatomic considerations
  o Embryology
  o Normal anatomy
  o Variant anatomy

• Physiology, pathology and pathophysiology
  o Normal histology/physiology/morphology
  o Pathologic conditions

• Procedural aspects
  o Indications and contraindications
  o Techniques, devices, materials
  o Results, efficacy
  o Risks and complications
  o Alternate techniques (surgical and medical therapeutic options)

PART II: Specific Topics
* The topics listed in Part I should be considered subheadings of the following.

• Biopsy and diagnostic fluid aspiration
  o Specific sites
    ▶ Thoracic (see also thoracic nonvascular intervention, below)
      ❖ Lung
      ❖ Mediastinum
      ❖ Pleura
    ▶ Cervical
      ❖ Thyroid/parathyroid
      ❖ Salivary
      ❖ Other neck
    ▶ Breast (including biopsy and tumor localization)
    ▶ Superficial tissues
    ▶ Abdominal
      ❖ Liver
      ❖ Pancreas
      ❖ Biliary system
      ❖ Spleen
      ❖ Adrenals
      ❖ Genitourinary
        ➢ Kidneys
        ➢ Ureters/bladder
        ➢ Prostate
        ➢ Uterus/ovaries
        ➢ Testes
      ❖ Gastrointestinal tract
      ❖ Retroperitoneum
      ❖ Peritoneum
        ➢ Paracentesis
        ➢ Peritoneal masses
        ➢ Bone
  o Tissue sampling considerations

• Fluid/abscess drainage
Sites
- Chest: see chest intervention, below
- Abdomen/Pelvis
  - Peritoneal
  - Retroperitoneal
  - Genitourinary
    - Renal abscess
    - Renal cyst
  - Liver
    - Hepatic abscess
    - Bilomas
    - Hepatic cysts
  - Pancreas
    - Types of collections, pancreatic inflammatory disease (abscess, pseudocyst, etc.)
      - Drainage in pancreatic inflammatory disease
- Spleen
- Gastrointestinal tract: see gastrointestinal intervention, below

Musculoskeletal
- Cysts
  - Cyst sclerosis
- Hematomas
  - Use of thrombolytic therapy
- Lymphoceles
- Lymphocele sclerosis
- Abscesses

Biliary intervention
- Percutaneous transhepatic cholangiography
- Biliary obstruction: percutaneous biliary drainage and stenting
  - Malignant obstruction and strictures
  - Primary biliary tumors: cholangiocellular carcinoma, etc.
  - Ampullary and periampullary tumors
  - Metastatic disease (intraductal, extrinsic)
- Benign obstruction and strictures
  - Primary disorders
    - Inflammatory (including sclerosing cholangitis)
    - Neoplastic
    - Post-surgical
- Percutaneous cholecystostomy
  - Acalculous cholecystitis
  - Calculous cholecystitis
  - As an adjunct to cholangiography and biliary drainage
- Treatment of biliary calculi
  - In the gallbladder
  - In the biliary ducts
- Gastrointestinal intervention
  - Gastrointestinal intubation
  - Percutaneous gastrostomy and gastrojejunostomy
  - Percutaneous jejunostomy
  - Percutaneous cecostomy
- Abscesses resulting from enteric leaks
- Gastrointestinal fistulas: interventional management
- Gastrointestinal strictures
- Gastrointestinal obstruction
- Gastrointestinal foreign body retrieval
- Interventional radiology in specific disorders
  - Appendicitis
  - Diverticulitis
  - Inflammatory bowel disease
- Genitourinary intervention
  - Renal obstruction
    - Antegrade pyelography and percutaneous nephrostomy
    - Whitaker test
    - Nephroureteral stenting
    - Upper urinary tract strictures
    - Upper urinary tract calculi
  - Urinary leaks/fistulas
  - Urinary diversions
  - Bladder
  - Urethra
    - Strictures
  - Male specific
    - Benign prostatic hyperplasia
  - Female specific
    - Fallopian tube recanalization
- Thoracic nonvascular intervention
  - Chest tube placement and management
    - Pleural collections
      - Pneumothorax
      - Empyema
        - Natural history
        - Principles of therapy
        - Use of fibrinolytic agents
    - Malignant pleural effusions
      - Sclerotherapy
    - Hemothorax
      - Principles of therapy
      - Use of fibrinolytic agents
  - Infected parenchymal collections
  - Tracheobronchial tree
    - Stricture dilatation and stenting
  - Transthoracic needle biopsy
  - Mediastinal disorders
- Foreign body retrieval: nonvascular
- Nonvascular interventional aspects of organ transplantation
  - Liver
  - Kidney
  - Pancreas
  - Small bowel
- Nonvascular interventional methods of tumor therapy
  - Direct injection techniques: ethanol, chemotherapeutic agents, cryotherapy
• Nonvascular interventional methods of organ ablation
• Pediatric Nonvascular Intervention (see the general topics parts I and II of this section; although clear differences exist in types and frequencies of procedures between pediatric and adult age groups, a detailed outline is not provided here)
• Other nonvascular intervention
I, ________________________________________________________________(print name)
have read and agree to the policies and procedures outlined within the MCG Radiology Residency Manual.

Signed, ____________________________________________________________ date _____________