INTEGRIS Health
Baptist Medical Center

DIAGNOSTIC RADIOLOGY
RESIDENCY HANDBOOK
2014-2015
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INTRODUCTION

The Diagnostic Radiology Residency Program has established this Diagnostic Radiology Residency Handbook as a reference and guide for residents of the Diagnostic Radiology Residency Program.

The Diagnostic Radiology Residency Handbook functions as a supplement to the INTEGRIS Graduate Medical Education Handbook, which is the official policy manual for all Graduate Medical Education programs at INTEGRIS facilities. If inconsistencies are identified between this Diagnostic Radiology Residency Handbook and the INTEGRIS Graduate Medical Education Handbook, the INTEGRIS Graduate Medical Education Handbook will be the overriding document.

The Diagnostic Radiology Residency Handbook will be updated annually. Individual policies may be updated more frequently. It is the responsibility of the resident to determine that he or she is relying on the most current version of any particular policy.
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<tr>
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<td>Spencer Clark, DO</td>
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PROGRAM PERSONNEL AND RESOURCES

1. Program Director: Georgianne Snowden MD
2. Designated Institutional Officer (DIO): Shirley Dearborn MD
3. Medical Education Manager: Annette Kezbers
4. Program Coordinator: Shannon Thompson
5. Faculty:
   i. David Burger MD, Breast radiology
   ii. Tad Cassidy MD, VIR
   iii. Mark Evans MD, Musculoskeletal radiology
   iv. Vince Farhood MD, Ultrasound*
   v. Manuel Fortes MD, VIR
   vi. Rob Gelczer MD, Musculoskeletal radiology*
   vii. Charles Groves MD, Breast radiology
   viii. Murray Hamilton MD, Cardiothoracic radiology*
   ix. Kerri Kirchhoff MD, Breast radiology*
   x. Stephen Lee MD, VIR
   xi. Allen Molloy MD, VIR*
   xii. Jimmy Nguyen MD, Abdominal radiology
   xiii. Hal O’Dell MD, Abdominal radiology*
   xiv. Georgianne Snowden MD, Neuroradiology*
   xv. Ken Stokes MD, VIR
   xvi. Iwan Tjauw MD, Neuroradiology
   xvii. Vikas Vij MD, Neuroradiology
   xviii. Clint Williamson MD, Nuclear radiology*
   xix. Faridali Ramji MD, Pediatric radiology* (at OU)

* denotes faculty member who is responsible for the educational content of that subspecialty area

6. Physics instruction: OUHSC Physicists
The purpose of the INTEGRIS Baptist Medical Center Diagnostic Radiology Residency Program is to recruit and produce knowledgeable radiologists who will provide excellent patient care and meaningful consultations for referring physicians. Our graduates will be prepared to present lectures, and discuss radiology issues at medical scientific meetings, to participate in training programs in their communities, and to advise the public on radiologic topics such as screening mammography. Our graduates will be familiar with recent scientific literature and be able to analyze articles critically, as part of an overall commitment to lifelong learning.

In the four years of residency training, the maximum period of training in any one of the nine subspecialty areas shall be 16 months. The nine subspecialty areas are neuroradiology, musculoskeletal radiology, vascular and interventional radiology, cardiothoracic radiology, breast radiology, abdominal radiology, pediatric radiology, ultrasonography (including obstetrical and vascular ultrasound) and nuclear radiology (including PET and nuclear cardiology).

Residents entering training on July 1, 2010 or thereafter must be provided appropriate clinical rotations and formal instruction in all subspecialties of diagnostic radiology and in the core subjects pertaining to diagnostic radiology (e.g. medical physics, physiology of contrast material, etc.) before taking the ABR Core Examination.

During the final year of diagnostic radiology training, these residents should be allowed within program resources, to select and participate in rotations, including “general radiology,” that will reflect their desired areas of concentration as they enter practice.

The following educational goals are to be distributed to radiology residents and faculty annually. Our residents will be instructed in the ACGME identified competencies, with the expectation that residents will demonstrate progressive performance improvement appropriate to his or her education level.

1. Patient Care and Procedural Skills:
   a. Residents must be able to provide patient care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health. The residents should provide patient care through safe, efficient, appropriately utilized, quality-controlled diagnostic and/or interventional radiology techniques. The resident must communicate effectively and in a timely manner the results of procedures, studies, and examinations to the referring physician and/or other appropriate individuals.
   b. Practice performance measurement:
      i. Global faculty evaluation (to include evaluation of knowledge about safety issues such as radiation doses, MRI safety, correct patient-exam site verification)
      ii. Case/procedure logs
RESIDENT RECRUITMENT AND EDUCATIONAL GOALS FOR THE PROGRAM (CONTINUED)

iii. Direct observation of selected procedures and other critical processes (such as obtaining informed consent)
iv. 270 or 360 degree evaluations

2. Medical Knowledge
   a. Residents must demonstrate knowledge of established and evolving biomedical, clinical, and epidemiological and social-behavioral sciences, as well as the application of this knowledge to patient care. Residents must demonstrate competence in their knowledge of the subspecialty clinical didactic content and general didactic content.
   b. Practice performance measurement:
      i. Global faculty evaluation (which includes the six competencies)
      ii. Yearly objective testing (mock oral boards, ABR in-service examination, ABR written board examination)
      iii. Journal club participation with emphasis on skills accessing, interpreting and applying best evidence in the radiology literature to patient care.

3. Practice-Based Learning and Improvement
   a. Residents must demonstrate the ability to investigate and evaluate their care of patients, to appraise and assimilate scientific evidence, and to continuously improve patient care based on constant self-evaluation and life-long learning.
   b. Practice performance measurements:
      i. Global faculty evaluation
      ii. Documentation of participation in quality assurance and regulatory activities

4. Interpersonal and Communication Skills
   a. Residents must demonstrate interpersonal and communication skills that result in the effective exchange of information and collaboration with patients, their families, and health professionals. Residents are expected to communicate effectively with patients, colleagues, referring physicians and other members of the health care team concerning imaging appropriateness, informed consent, safety issues and results of imaging tests or procedures.
   b. Practice performance measurements:
      i. Global faculty evaluation
      ii. 270-360 degree evaluations
      iii. Evaluation of quality of radiology reports
      iv. Direct observation of communication issues (e.g., informed consent, speaking with patients about adverse events or outcomes of imaging tests, consultations with referring clinicians, interactions with non-physician members of the health care team.)
RESIDENT RECRUITMENT AND EDUCATIONAL GOALS FOR THE PROGRAM
(CONTINUED)

5. Professionalism
   a. Residents must demonstrate a commitment to carrying out professional responsibilities and an adherence to ethical principles, and sensitivity to a diverse patient population. Residents are expected to commit to high standards of professional conduct, demonstrating altruism, compassion, honesty and integrity. Residents must follow principles of ethics and confidentiality and consider religious, ethnic, gender, educational and other differences in interacting with patients and other members of the health care team.
   b. Practice performance measurements
      i. Global faculty evaluation
      ii. 270-360 degree evaluations
      iii. Verify status of medical license
      iv. Documentation of compliance with institutional and departmental polices (e.g., conference attendance, HIPPA, TJC, dress code)

6. Systems-Based Practice
   a. Residents must demonstrate an awareness of and responsiveness to the larger context and system of health care, as well as the ability to call effectively on other resources in the system to provide optimal health care. Residents will 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. Residents will optimize coordination of patient care both within one’s own practice and within the healthcare system. Residents will consult with other healthcare professionals, and educated healthcare consumers, regarding the most appropriate utilization of imaging resources.
   b. Residents must participate in program specific and institutional quality improvement and patient safety activities. Participation will include bimonthly Patient Safety/Process Quality Improvement committee meetings, and participation in other committees, such as radiation safety committee, medical staff committees and review of complications and deaths.
   c. Practice performance measurements:
      i. Global faculty evaluation
      ii. Documentation of resident participation in analysis of systems-based problem
      iii. Documentation of active participation in multi-disciplinary conferences.
DAILY WORK SCHEDULE

7 am  Teaching file review – recommended
      Interventional service
      Conferences:
          Breast conference
          Radiology Pathology conference
          Liver Transplant conference
          GI conference
          GU conference
          Lung conference

8 am - 5 pm Most days

Call: Call resident will begin their day at 8 am (or at 7 am if required by a conference or rotation requirement) and work until 8 pm.

Night shift: Night shift resident will begin their shift at 8 pm and work until after checkout the following morning (approximately 8 am)

Beginning in September, first year residents who have had a fluoroscopic rotation will begin rotating Saturday morning coverage 8 am-12 pm.

Weekend and holiday: One resident will work 8 am-8 pm and a second resident will work 8 pm-8 am (approximately, following checkout). First year residents will also work 8 am-12 pm on Sundays after September of their first year.

Vascular/interventional rotation may have later finishing times. The residents are expected to stay to complete work in progress. All fluoroscopic procedures completed prior to 4 pm conference must be checked out with staff and dictated prior to the performing resident leaving for the day.

If a fluoroscopic study will extend into the evening/night hours, the resident who started the exam must discuss the case with the resident on call and leave a detailed note detailing pertinent findings seen so far, indications for exam, altered anatomy due to surgery, etc.
APPOINTMENT OF FELLOWS AND OTHER LEARNERS

Radiology Associates, LLC offers an imaging fellowship based in its outpatient-imaging center.

Our program allows for limited medical student rotations from other programs including the OU College of Medicine and Emergency Medicine residency at ISWMC and the Great Plains Family Practice residency.

These rotating learners are a welcome addition to our residency, as they increase awareness of the indications, strengths and limitations of imaging studies. They provide an opportunity for radiology residents to act as teachers, and they act as teachers to our radiology residents. The presence of these learners should foster an environment of teamwork and heighten awareness of the need to work within an interdisciplinary team to provide care to patients.

The presence of these learners should not interfere with our appointed residents’ education. If you believe their presence is a problem, please discuss your concerns with your program director or another faculty member.

The presence of these learners is reported to the DIO and GMEC in accordance with our sponsoring institution guidelines.

ROTATIONS FOR VISITORS

Resident, Physician Assistant, Medical Student, and Extern rotations in Diagnostic Radiology must be approved in advance by the Program Director. Anyone from an outside institution must register through the Graduate Medical Education Office.
RESIDENCY ROTATIONS

Overview:

The resident is expected to check the schedule on their service each night before leaving and each morning on arrival, review the medical records of the patients scheduled to determine the appropriateness of the requested study for the particular patient and clinical problem. The resident should read about the study and/or clinical problem in advance and discuss questions with staff and/or other residents. Notebooks concerning various radiologic procedures are available for reference.

Residents are assigned to one specific rotation per month but may occasionally be asked to assist with other services. If two procedures are scheduled on a service simultaneously, a resident may ask one of the other residents to help. Please ask the other resident directly.

While residents have a specific rotation assignment each month, it is expected that a spirit of teamwork and a desire for learning by doing will lead each resident to interpret studies outside his or her specific rotation in response to shifting examination volumes.

The sections that follow describe the expectations for residents during each rotation.
FLUOROSCOPY

These residents must be in the department and ready to perform studies at 8 am. These residents will:

1. Perform all barium swallows, dysphagiagrams, upper GIs, small bowel studies, barium enemas (or the same studies when gastrografin is used).
2. Interpret accompanying abdomen or acute abdomen series when a patient comes for a fluoroscopic study.
3. Interpret intraoperative studies, including cholangiograms, retrograde pyelograms, cystograms, etc.
4. Perform all intravenous urograms, sialograms, cystograms, arthrograms, myelograms, retrograde urethrogram performed in the Radiology Department.
5. Perform or assist in all hysterosalpingograms.
6. Read as many ER studies as possible, with emphasis on abdominal imaging.

It is expected that residents will work together in a cooperative manner to ensure both residents have a fair share of the workload and an adequate exposure to many kinds of fluoroscopic studies. When the fluoroscopic schedule is caught up, it is expected that the residents on the fluoroscopy rotation will interpret examinations from other modalities such as CT, US or plain film. It is expected that residents will not leave the hospital for the day until the fluoroscopy studies they performed have been checked out by staff and dictated. If a study (such as a small bowel exam) goes beyond 4 pm, the resident who began the study must discuss the case with the on call resident and leave a detailed note prior to leaving the hospital for the day.

Fluoroscopic examinations on pediatric patients MUST be reviewed with staff prior to releasing the patient from the department, particularly if the resident performing the examination has yet to do a pediatric radiology rotation.

Please try to get NICU patients back to the floor as soon as possible, preferably staying in the department for less than an hour.

The staff members of the residency committee have decided that in order to increase patient safety by decreasing the risk of aspiration, if there is a large amount of gastrografin residual in the stomach following a fluoroscopic study, the resident performing the examination should place an NG tube and remove as much gastrografin as possible.
ULTRASOUND

1. Interpret ultrasound exams at all INTEGRIS locations.

2. Learn to operate ultrasound equipment. Specifically to understand the use of variable transducers as they relate to types of exams.

3. Perform routine examinations with a senior technologist present.

4. Attend all ultrasound department conferences.

5. Prepare interesting cases for presentation. Resident must prepare at least four interesting cases to present to other residents during their resident conferences.

6. As with all rotations, if US volume is low, the resident is expected to read studies from other services.

First year residents are expected to scan patients and check out those cases with staff. Other year residents are strongly encouraged to scan patients as well.
CHEST/ABDOMEN/PELVIS

1. Interpret CT examinations of the chest, abdomen, and pelvis at all INTEGRIS locations, including CT chest, HRCT chest, CT PE protocol, CT abdomen/pelvis, and CT renal stone protocol. It is expected that the resident will use the patient’s radiographs as a comparison when looking at CT examinations to improve radiographic interpretation skills.

2. Interpret as many inpatient, outpatient, and ER radiographs as possible with assigned staff, review, approve, and perform CT guided biopsies of the chest, abdomen, and pelvis.


4. As in all rotations, if volume is low, resident is expected to pitch in by interpreting ultrasound, nuclear medicine, MRI, and radiographs.

5. The biopsy/CT resident is responsible for maintaining and updating the CT biopsy log book which is kept in the CT/bx room. This includes adding patient sticker and appropriate information, with follow-up pathology/cytology reports.

6. This log book is an excellent source of material for Radiology/Pathology conference and for AFIP cases, case reports, etc.
NUCLEAR MEDICINE

1. Interpret nuclear medicine procedures at all INTEGRIS locations.

2. Participate in performance/reading of nuclear medicine studies at each of the following facilities.
   - INTEGRIS Baptist Medical Center
   - Medical Plaza Imaging
   - Children’s Medical Center of Dallas

3. Observe radiopharmacy procedures at INTEGRIS Baptist Medical Center (2 mornings during residency)

4. Contact the chief technologist of each site daily to assure participation in as many studies as possible.

5. Attend and maintain a record of all thyroid therapy cases.
   You must perform 3 low dose and 3 high dose I-131 therapies (NRC regulations).


7. Learn how the nuclear medicine instruments work (one week).

8. To ensure a broad diversity of experience in Nuclear Medicine participate in (and keep a log which must be available for inspection) an average of 2 studies per day.

9. As in all rotations, if work volume on Nuclear Medicine is slow, the resident is expected to read studies from other services, such as CT, US, fluoroscopy, or plain film.

10. During your month of rotation, you are expected to prepare three interesting cases to present to fellow residents +/- staff at conference.
Nuclear Regulatory Compliance

ABR training in nuclear medicine - compliance with NRC regulations

The U.S. Nuclear Regulatory Commission (NRC) has established guidelines for physicians who wish to achieve the status of Authorized User (AU) of radioisotopes. The ABR is committed to compliance by:

1. Providing information about the required components of training and experience
2. Requiring from program directors a written attestation that the proper training has been given, and a case log of I-131 therapy work experience supervised and attested to by appropriate AU-preceptor(s) and
3. Testing knowledge of the required subjects

The ABR requires a resident training program to fulfill the NRC requirements for training and experience of radiology residents as does the Diagnostic Radiology Residency Review Committee (see reference to these requirements below). The ABR endeavors to meet those requirements within the context of an overall balanced radiological curriculum and with a set of didactic, laboratory and clinical experiences in nuclear medicine that ensure safe and effective use of radionuclides by board-certified radiologists. The ABR believes that these items are important components of a responsible education for radiologists and contribute to the safety of medical practice in ways that are broadly supported by organized medicine, regulators and the public.

NRC training and experience requirements

Candidates seeking certification for diagnostic radiology must meet the specific training and experience requirements described in 10 CFR 35.290 (c)(1)(i) and (c)(1)(ii); 10 CFR 35.392 (c)(1) and (c)(2); and 10 CFR 35.394 (c)(1), (c)(2), and (c)(3). Radiation safety, radionuclide handling and quality control, and related topics specified in 10 CFR 35.290, 10 CFR 35.392, and 10 CFR 35.394 must be covered.

Detailed information regarding 10 CFR 35.290, 35.392, and 35.394 may be found via the NRC Electronic Reading Room, which provides access to the NRC Regulations, Frequently Asked Questions and other pertinent references.

Specifically, each candidate for AU status through the ABR pathway must have completed a minimum of 700 hours of training and experience in imaging and localization studies, which must include 80 hours of classroom and laboratory training in basic radionuclide handling techniques applicable to both the medical use of unsealed byproduct material for imaging and localization studies as well as the medical use of sodium iodide I-131 for procedures requiring a written directive. In addition, each candidate must also meet the training and experience requirements specified in §35.392 and §35.294 for medical uses of radiiodine I-131 ($\leq$33 mCi and $>$33 mCi, respectively) requiring a written directive. The training and experience must include, at a minimum, the following:

1. Classroom and laboratory training (minimum of 80 hours) in the areas of
   a. radiation physics and instrumentation
   b. radiation protection
   c. mathematics pertaining to the use and measurement of radioactivity
   d. chemistry of by-product material for medical use
   e. radiation biology
Nuclear Regulatory Compliance (continued)

2. Work experience for imaging and localization studies (§35.290) under the supervision of an preceptor AU who meets the requirements in §35.57, §35.290, or §35.290(c)(1)(ii)(G), or equivalent Agreement State requirements, involving the following:

   a. ordering, receiving, and unpacking radioactive materials safely and performing the related radiation surveys
   b. performing quality control procedures on instruments used to determine the activity of dosages and performing checks for proper operation of survey meters
   c. calculating, measuring, and safely preparing patient or human research subject dosages
   d. using administrative controls to prevent a medical event involving the use of unsealed byproduct materials
   e. using procedures to safely contain spilled radioactive material and using proper decontamination procedures
   f. administering dosages of radioactive drugs to patients or human research subjects
   g. eluting generator systems appropriate for preparation of radioactive drugs for imaging and localization studies, measuring and testing the eluate for radionuclidic purity, and processing the eluate with reagent kits to prepare labeled radioactive drugs

3. Work experience for the oral administration of sodium iodide I-131 (§35.392 and §35.394) requiring a written directive.

   A. Experience under §35.392 must be obtained under the supervision of an AU who meets the requirements in §35.390, 35.392, 35.394 or equivalent Agreement State requirements. A supervising AU who meets the requirements in §35.390 (b) must also have experience in the oral administration of sodium iodide I-131 for which a written directive is required.

   This work experience must involve the following:

   a. ordering, receiving, and unpacking radioactive materials safely and performing the related radiation surveys
   b. performing quality control procedures on instruments used to determine the activity of dosages and performing checks for proper operation of survey meters
   c. calculating, measuring, and safely preparing patient or human research subject dosages
   d. using administrative controls to prevent a medical event involving the use of unsealed byproduct materials
   e. using procedures to safely contain spilled radioactive material and using proper decontamination procedures
   f. administering doses to patients or human research subjects that include at least three cases involving the oral administration of ≤33mCi of sodium iodide I-131
Nuclear Regulatory Compliance (continued)

I-131 case experience documentation

1. Regarding §35.392, the ABR requires that candidates must have completed a minimum of three (3) cases that involve administration of ≤33 mCi of I-131 for therapy under a preceptor AU who meets the requirements in §§35.390, 35.392, 35.394 or equivalent Agreement State requirements. A supervising AU who meets the requirements in §35.390 (b) must also have experience in the oral administration of sodium iodide I-131 for which a written directive is required. A logbook of these therapies must be kept by the resident and submitted to the ABR in the format given below.

2. Regarding §35.394, the ABR requires that candidates must have completed a minimum of three (3) cases that involve the administration of >33 mCi of I-131 for therapy under a preceptor AU who meets the requirements in §§35.57, 35.390, 35.394, or equivalent Agreement State requirements. A supervising AU, who meets the requirements in §35.390(b), must also have experience in administering dosages as specified in §35.390(b)(1)(ii)(G)(2). A logbook of these therapies must be kept by the resident and submitted to the ABR in the format given below.

Forms to be submitted to the ABR

Two (2) forms have been designed by the ABR to document compliance with and completion of the required NRC training and experience. Both completed forms must be submitted on behalf of each candidate in order for the candidate to be eligible for an ABR Diagnostic Radiology Certificate with the AU-Eligible designation.

1. ABR Form A (Program Director Attestation)
2. ABR Form B (Candidate I-131 Case Log)

ABR Form A - Program Director Attestation

This form is intended to assure the ABR (and, thus, the NRC) that each individual candidate has completed the required training. The program director must submit an attestation form. There should not be blanket approval of a resident class, because the training and experience in NRC-related aspects of nuclear medicine may vary within the group. The decision to provide attestations should be individualized and linked to completion of the NRC curriculum by individual residents.

Under no circumstances should program directors designate as NRC-compliant a candidate who has not completed the full course of study mandated in the NRC curriculum for authorized users. Further, false attestation of completion of training for NRC noncompliant residents would jeopardize the reputation and integrity of the residency program, the ABR, and the Residency Review Committee (RRC), and threaten the relationship between these organizations and the NRC.

The ABR reserves the right to further survey or explore with those residents the manner in which they completed the curricular requirements. Whether or not a resident completes the full NRC-mandated curriculum, the resident must have completed 16 or more clinical weeks of nuclear medicine during the four years of training as required by the Diagnostic Radiology RRC and will be responsible to answer NRC-related questions on all ABR examinations. Time away (e.g., vacations, AFIP, etc.) cannot be counted toward the 16-week requirement in nuclear medicine.
Nuclear Regulatory Compliance (continued)

Form B - Candidate I-131 Case Log

Because of HIPAA concerns, no data that might identify a patient are to be included on Form B.

Please note that participation in three (3) I-131 administrations in each of the two categories is required. Because patients requiring I-131 therapy in amounts ≤33 mCi and >33 mCi present in very different clinical settings, and to assure clinical experience with both levels of I-131 administration, each set of three cases must be discrete and obtained in the proper category. Thus, administered amounts of I-131 in each category, ≤33 mCi and >33 mCi, must actually be within the appropriate category in the case log. Administered activity >33 mCi of I-131 cannot be used in the category designated for ≤33 mCi of I-131 or vice versa. This log is to be submitted by the program director along with the other materials that attest to the resident’s oral exam eligibility.

Both Form A and Form B are to be submitted by the program director along with the other materials that attest to the resident’s oral exam eligibility.

■ ABR examinations and the NRC curriculum

The NRC accepts ABR certification as evidence that a practitioner is properly trained to safely and effectively use radioactive materials in nuclear medicine. Content addressing safety and the handling of radioisotopes as specified by the NRC-required curriculum is embedded in the ABR examinations leading to initial certification in diagnostic radiology, including the physics examination, the written examination, and the oral examination taken by all candidates. The same content will also be included in the Core and Certifying examinations beginning in 2013.

Candidates who take the ABR oral examination are tested on NRC items during the examination in nuclear medicine. The NRC content counts towards the pass/fail score in the nuclear medicine category of the oral examination. Some of the oral examination items depict situations/scenarios that allow the examiner and candidate to discuss pertinent NRC principles. Other questions come from clinical scans and relate to issues of radiopharmaceutical biodistribution (e.g., critical organ doses), to I-131 therapy or to other relevant issues.

The ABR recommends that all residency programs assure that their training in nuclear medicine is compliant with all the elements listed by NRC and on the ABR website. In this way, all residents will be well prepared and qualified to take the nuclear medicine portion of the ABR oral exam, and also will be well prepared to provide nuclear medicine services safely and effectively.

■ The ABR AU-eligible certificate in diagnostic radiology

The preceding ABR forms do not have to be completed for a resident to take the ABR exams, including the nuclear medicine section of the oral exam. Timely submission of the ABR forms, however, documents completion of the required NRC training and allows candidates who fulfill all the requirements listed above on Form A and Form B and who pass all their ABR exams, including the required NRC-related content, to receive an ABR certificate that contains the additional designation AU-eligible. This designation will appear near the left lower corner of the certificate.
Nuclear Regulatory Compliance (continued)

If Forms A and B are not completed and submitted to ABR for a candidate, *AU-eligible* certificate designation will not be possible, even though the NRC-required training and experience may have been completed and the examinations passed by the candidate.

An *AU-eligible* certificate indicates that the diplomate has fulfilled all the training and experience requirements of the NRC and passed all the ABR examinations. It means that the person is eligible through the ABR board certification pathway to be approved by the NRC as an Authorized User (AU) of medical radionuclides for imaging and localization studies and for oral administration of sodium iodide I-131 in amounts ≤33 mCi and >33 mCi requiring a written directive. Such a person can apply to the NRC for authorized user status, which allows the diplomate to be listed on the institutional or practice site license and oversee the safe and effective medical uses of radionuclides.

Authorized User status is obtained upon written application to the NRC/Agreement State and also requires submission of an NRC preceptor form that has been completed and signed by the preceptor, who must be an AU. The forms are available on the NRC website.

ABR diplomates who do not have the designation *AU-eligible* on their certificates also may apply to the NRC for status as an AU via the alternate pathway, but they will be required to provide detailed information to the NRC about their relevant training and experience.

**Reference:**

**NRC-relevant diagnostic radiology RRC program requirements**

There must be at least 80 hours of didactic (classroom and laboratory) training under the direction of an authorized user (AU). This training must include the following subjects as they relate to nuclear medicine:

- a. diagnostic medical physics, instrumentation, and radiation biology;
- b. patient and medical personnel safety (i.e., radiation protection);
- c. the chemistry of byproduct material for medical use;
- d. biologic and pharmacologic actions of materials administered in diagnostic and therapeutic procedures; and
- e. topics in safe handling, administration, and quality control of radionuclide doses used in clinical medicine.

The didactic instruction and work experience must include ordering, receiving, and unpacking radioactive material safely, and performing the related radiation surveys; the safe elution and quality control (QC) of radionuclide generator systems; calculating, measuring, and safely preparing patient dosages; calibration and QC of survey meters and dose calibrators; safe handling and administration of therapeutic doses of unsealed radionuclide sources (i.e., I-131); written directives; response to radiation spills and accidents (containment and decontamination procedures); radiation signage and related materials; and using administrative controls to prevent medical events involving the use of unsealed byproduct material.

Residents must demonstrate hands-on work experience when they perform the supervised work experience requirements. Observation alone is not sufficient.
§ 35.290 Training for imaging and localization studies

Please complete the following activities and have them attested by the nuclear medicine technologist in the laboratory and fax to 703-995-4433.

(B) Performing quality control procedures on instruments used to determine the activity of dosages and performing checks for proper operation of survey meters;

(1) Ordering, receiving, and unpacking radioactive materials safely and performing the related radiation surveys;
   Date Completed ________________  Attestation Signature______________

(2) Calibrating instruments and performing quality control procedures used to determine the activity of dosages and performing checks for proper operation of survey meters;
   Date Completed ________________  Attestation Signature______________

(3) Calculating, measuring, and safely preparing patient or human research subject dosages;
   Date Completed ________________  Attestation Signature______________

(4) Using administrative controls to prevent a medical event involving the use of unsealed byproduct material;
   Date Completed ________________  Attestation Signature______________

(5) Using procedures to safely contain spilled radioactive material and using proper decontamination procedures;
   Date Completed ________________  Attestation Signature______________

(6) Administering dosages of radioactive drugs to patients or human research subjects;
   Date Completed ________________  Attestation Signature______________

Attest: (must be certified nuclear medicine technologist, authorized user, Radiation Safety Officer, or certified medical physicist)

Name: ______________________

Title: ______________________

Telephone Number: __________
PHYSICS, RADIATION BIOLOGY, AND RADIATION PROTECTION

Physics instruction is required throughout all four years of residency. In the first three years, the instruction is achieved through a combination of didactic lectures given by OUHSC physicists and through participation in RSNA physics teaching modules. Prior to sitting for the CORE exam, residents will generally attend a physics review course. In the final year of residency, physics instruction will continue in a clinically based approach.

RSNA physics teaching modules may be accessed at:

Residents can become members to access this site for free by completing a questionnaire on the web site.

Residents must complete all modules and include the printed certificates in their learning portfolios.

The required textbook is The Essential Physics of Medical Imaging, 2nd edition, Bushberg, Seibert, Leidholdt, and Boone
Lippincott, Williams & Wilkins, 2002

Additional instruction regarding radiation biology and radiation protection is provided on http://www.radquiz.com/physics/html
VASCULAR AND INTERVENTIONAL RADIOLOGY

1. Perform all angiographic procedures referred to Radiology Associates.

2. Work up all angiography and interventional patients prior to the scheduled procedure. Inpatients should be evaluated the evening prior to the procedure.

3. Perform some CT and US guided biopsies and drainages.

4. Round on and enter progress notes on all inpatients on the interventional service. Check the schedule with the interventional radiology secretary Emily (949-4161) at the end of each day.

5. Complete dictations daily after reviewing films with staff.

6. Wear a pager during the day.

7. Obtain approval for vacation, in advance, from the Vascular/Interventional staff in addition to other regularly required approval.

8. Maintain a log of all procedures you perform. The log will include all:

   a. Neuroradiologic interventions and angiograms
   b. Vascular and interventional procedures
   c. Imaging guided biopsies
   d. Imaging guided drainages
   e. Non coronary angioplasties
   f. Embolization and infusion procedures
   g. Percutaneous introduction techniques
   h. Arthrography and joint aspirations

Logbooks should be maintained on the ACGME web site for procedure tracking. Procedures not tracked on the ACGME web site should be available in a form, which can be permanently placed in your file. Complications must be recorded in the log. The Accreditation Council for Graduate Medical Education requires the logs; you may need these logs to be credentialed to do certain procedures after residency. The Program Director will review the log every 6 months.
9. The resident on the Vascular/Interventional service must report for duty daily at 8am. If a 7am case is scheduled, the resident should come in early to participate in that case.

10. The Vascular/Interventional resident should make an effort to go to the residents’ conferences. However, there will be times that the resident will be involved in a case during conference times and will therefore miss conference.

11. You are required to prepare and present one Vascular/Interventional conference during the course of your rotation. This will usually be scheduled toward the end of the month. This lecture can then be given to the program coordinator as a teaching file case.

12. You will get out of this rotation what you put in to it. It is best if you read up on procedures that are scheduled the night before the procedure is to be done.

13. You will be expected to learn about:

   a. Informed consent
   b. Conscious sedation (including actions and side effects of commonly used medications and means of reversal if indicated)
   c. Sterile technique
   d. Indications, risks, benefits, contraindications and alternatives to interventional and angiographic procedures.
   e. Preprocedure workup of patients
   f. Post procedure care
   g. Performance of angiographic and interventional procedures
   h. Procedural and post procedural pain management

14. Residents will be given graduated responsibility consistent with interest and ability. Residents will generally observe and assist early in the rotation and will be gradually given more responsibility, up to and including performing as primary operator under the immediate supervision of one of the attending staff.

15. The interventional staff looks forward to having you on the service, and to making this an educational experience that will be of benefit regardless of the area of radiology you ultimately decide to practice.
CARDIOVASCULAR ROTATION

During the cardiovascular rotation, the assigned resident is responsible for:

1. checking the Nuclear Cardiology scheduled cases for the week and attending nuclear cardiac stress tests.
2. rotating with Heart Hospital CT scan techs to watch the Cardiac CTA technique.
3. spending time with Chasity Clark (CT technologist lead) in the mornings during cardiac CTAs. Chasity can be contacted at 405-552-0185.

Dr. Jeffrey Nackos provides cardiac educational lectures via teleconference on a monthly basis.

Texts which are useful during the rotation are:
- Pocket Radiologists Cardiac
- Cardiovascular chapter in Purple Primer
- CV section in Mettler
- Case Review Series Cardiac

The cardiac section in the Gold Mine series is a good board review. The Thoracic Radiology website (www.thoracicrad.org) has several power point lectures of approximately 20-30 minutes in length. Also, www.scmr.org has a case of the week series.

Cardiac resident will interpret 15 cardiovascular or thoracic imaging studies per day.

Goals and Objectives:

1. Observe and perform interpretation of cardiac MR studies.
2. Observe and perform interpretation of CT coronary studies.
3. Observe and perform interpretation of nuclear cardiac studies.
4. Understand cardiac and coronary artery anatomy.
5. Increase competence in interpretation of thoracic radiograph.
6. Spend time with technologists to see how cardiac examinations are performed.
COMPUTED TOMOGRAPHY (CT)

1. Interpret CT scans at all INTEGRIS locations.

2. Perform occasional CT biopsies depending on schedule of residents.

3. Assist with the interpretation of musculoskeletal and neuroradiology examinations.

4. As in all rotations, if volume is low, resident is expected to pitch in by interpreting ultrasound, nuclear medicine, MRI, and radiographs.

RADIOLOGY PROCEDURAL PROTOCOL
CT GUIDED LUNG BIOPSY

1. Indications and Scheduling
   a. To allow soft tissue evaluation of lung, pleural, and mediastinal masses
   b. All patients and relevant imaging will be reviewed prior to scheduling with attending.

2. Discussion of Risks
   a. Bleeding
   b. Pain
   c. Infection
   d. Pneumothorax
   e. Allergic reaction to medications

3. Consent
   a. Appropriate Consent & Documentation.
   b. Must observe either completed consent form (including operator, date, patient sticker, procedure, patient’s interpretation, signature of patient or appropriate representative or indication of phone consent, witness signature (X2 in case of phone consent) OR medical necessity order in the chart.

4. Pre-procedure chart and film review
   a. For inpatients, review chart for order from physician, consent signed by patient (or appropriate family member or guardian or phone consent from same) or medical necessity. Order labs in chart for any coagulopathies (if INR >1.5, correction of coagulopathy needs to occur).
   b. For outpatient procedures, review any available bloodwork for coagulopathies, make sure consent has been signed and understood, and determine if order has been faxed to our schedulers and from whom.
   c. Review all relevant studies prior to procedure to determine approach and patient positioning.
d. A planning non-contrast CT of the region to be targeted is obtained.

5. Hand hygiene
   a. Observed by washing hands with both an antimicrobial soap and water or with waterless alcohol foam.

6. Sterile technique
   a. Requires use of sterile gloves with cap and mask. Eye protection is mandatory.
   b. A sterile drape is placed after site determined by planning non-contrast CT of region.
   c. Prior to placement of the sterile drape, clean skin at the site (with an appropriate field to include at least the size of the fenestration in the drape plus approximately one inch around that).
      i. With the use of Chloraprep (2% chlorhexidine with 70% isopropyl alcohol), manufacturer recommendation is to scrub the area for at least 30 seconds and remain on the skin to air dry before the area is considered sterile.

7. Materials
   a. GUTS Tray
   b. Sterile Gloves
   c. Cap and Mask
   d. Lead apron
   e. Biopsy Needle (Determine core vs. FNA)

8. Technique
   a. Moderate conscious sedation per protocol should be started prior to any invasive portion of the procedure. After the sterile drape is in place, Lidocaine 1% is injected for local anesthesia, a wheel at the skin and along a track.
   b. A small nick is made at the insertion site with a scalpel if core biopsy only.
   c. Using CT guidance, a needle is advanced into the periphery of the mass and either an aspirate or core obtained and submitted to pathology.
   d. After pathology confirms adequacy a post procedure CT is obtained to evaluate for potential complications.

9. Post Procedure Orders
   a. Stat upright expiratory CXR with comment of “s/p <side> lung biopsy “at 1 and 3 hours after procedure completed.
b. The post procedure films will be reviewed and read by the performing resident and diagnostic staff. If for any reason the resident is unable to review film they are responsible to find a substitute.

c. All outpatients will have an estimated time of discharge with the phrase cxr must be cleared prior to discharge.

d. Any patient with a pneumothorax regardless of size or symptoms will be reviewed with the interventional radiologist on call immediately after discovery. The resident will participate in any follow-up procedures such as chest tube placement with the interventional MD or PA.

e. If the patient is to be admitted post procedure, the resident performing the procedure is responsible for orders, notes, and chest tube management in consultation with VIR MD on call. This includes daily rounds, discharge, and follow-up. If patient is to be seen on the weekend, the resident on service will check out to on call VIR MD.

10. Documentation and Dictation
    a. Progress Note to include procedure, any modalities used (US, Fluoro, CT), operator, location of procedure (R or L), how many and type of samples, all medications administered, complications, and post procedure condition of patient.
    b. Dictation per performing resident.
**MEDICAL PLAZA IMAGING CENTER (IC)**

1. Read all body, musculoskeletal, and neuroradiology CT and MR studies.

2. Read PET-CT studies.

3. Interpret some ultrasounds and radiographs.

4. Interpret nuclear medicine studies and participate in nuclear medicine procedures.

There will be two residents on the IC rotation each month. If both residents agree, the residents may alternate being on the body side and neuro side. This alternation should be no more frequent than once a week, meaning that each resident will spend a full week on one side before going to the other side. This is intended to provide a better educational experience through intensity and continuity.

The outpatient setting is an exceptional experience and allows a more flexible environment with time to visit with our nuclear medicine technologist and get more time witnessing/participating in morning quality assurance testing for the nuclear medicine lab and equipment.

You will have a large number of CT/MRI exams as well as plain film/US/nuclear medicine exams with one-on-one staff/resident read-outs.

Vacation is strongly discouraged during this rotation.
MAMMOGRAPHY

All mammography at INTEGRIS Baptist Medical Center, stereotactic biopsies, ultrasound-guided biopsies, and breast ultrasounds are performed at the Comprehensive Breast Center. The resident will:

1. Participate in all breast localization procedures.
   a. Review all prior studies for breast localization with staff. Staff will check you, at least one, preferably two days before the procedure. Review the approach you will use with the staff. Some surgeons prefer the anterior approach unless there are complications.
   b. Show the needle localization to the staff. Draw a circle around the lesion. Label the orientation of the study.
   c. Review any complications or problems immediately.
   d. Review breast localization images to ensure the lesion is removed. Note the adequacy of the surgical margins.

2. Review and participate in reporting of screening studies.

3. Attend all problem solving mammography cases.

4. Participate in stereotactic biopsies.

5. Participate in breast ultrasound and ultrasound guided breast interventional procedures. Practice ultrasound guided biopsy with a phantom.

6. Participate in review and reporting of breast MR studies.

7. Practice US guided biopsies on chicken breast phantom. You may use money from your book fund to purchase the chicken.

MQSA Breast Imaging Experience Requirements

The RRC for Diagnostic Radiology requires 3 months of breast imaging. The latest RRC regulations state “There must be a minimum of 12 weeks of clinical rotations in breast imaging. Each resident should have documentation of the interpretation of at least 240 mammograms within a 6-month period within the last 2 years of the residency program.”
MAMMOGRAPHY (CONTINUED)

Residents completing radiology residency must fulfill the following requirements as initial qualifications for interpreting mammograms:

A. Be licensed to practice medicine in a State.
B. Have a minimum of 60 hours of documented medical education in mammography, which shall include: Instruction in the interpretation of mammograms and education in basic breast anatomy, pathology, physiology, technical aspects of mammography, and quality assurance and quality control in mammography. Hours spent in residency specifically devoted to mammography will be accepted if documented in writing by the appropriate representative of the training institution.
C. Be board certified in Diagnostic Radiology.
   a) If the radiologist has become appropriately board certified at the first allowable time, they must have interpreted or multi-read at least 240 mammographic examinations under the direct supervision of an interpreting physician in any 6-month period during the last 2 years of a diagnostic radiology residency.
   b) If they are not board certified at the first allowable time, the radiologist must have interpreted or multi-read at least 240 mammographic examinations within the 6-month period immediately prior to the date that the physician qualifies as an interpreting physician. This interpretation or multi-reading shall be under the direct supervision of an interpreting physician.
1. **Children's Hospital of Oklahoma**: Two months General Pediatric Radiology
   The supervising attending at Children’s Hospital will assign rotation duties and activities.

2. **Children’s Medical Center of Dallas**: One month
   The supervising attending will determine rotation specifics. The rotation should include pediatric:
   - CT
   - MRI
   - Ultrasound
   - Nuclear Medicine
   - GI
   - GU
   - Radiographs
   - Cardiac angiography
   - Cardiac ultrasound
   - Peripheral angiography

3. No vacation or personal time can be taken on these away rotations unless approved in advance by the IBMC Radiology Residency Program Director.

4. The resident on the Dallas rotation will take four nights of call, which will not occur on a Friday, Saturday, or Sunday.

5. The Dallas rotation will consist of one week of body imaging and three weeks of neuroradiology.
EMERGENCY RADIOLOGY

There are at least two residents on this service every month. One resident will work the night shift; the other resident will be off. Night shift begins at 8 pm and ends following checkout the next morning (approximately 10 am). Generally, the night shift resident will work 3 or 4 nights in a row, and the other resident will be off. Subsequently, the first resident will be off and the second resident will work. Residents can work no more than 6 nights of consecutive night float duty, as per the new ACGME common program requirements.

Call: Call resident begins the morning at 7 or 8 am, depending upon lectures and clinical responsibilities. The call resident attends all the scheduled lectures for that day, and then works until 8 pm. Any studies which the call resident interprets after the staff radiologist has left for the night should have a note regarding the preliminary findings typed into the information box on PACS. This note should also include the name of the person to whom the report was given and the time.

Weekend call: Call resident arrives at 8 am on Saturday or Sunday and works until 8 pm (Night shift starts at 8 pm). Any study that the call resident interprets after the staff radiologist has left for the night should have a note regarding the preliminary findings typed into the information box on PACS. This note should also include the name of the person to whom the report was given and the time.

Studies for which a preliminary report is rendered will have the preliminary report typed into PACS with the name of the person who received the report and the time. Naturally, the residents should go over these studies with staff if there are questions about the exam, and residents who wish to dictate these studies are encouraged to do so.
1. Interpret radiographs, US, CT, MRI, and PET/CT studies on oncologic and nononcologic patients.
2. Learn about imaging findings related to cancer treatment.
3. Learn about cancer staging and follow-up.
4. Participate in the biweekly multidisciplinary cancer conference.
5. When ICIO schedule is completed, interpret imaging at other INTEGRIS facilities.
6. Demonstrate awareness of contrast induced nephrotoxicity, nephrogenic systemic sclerosis, and radiation dose.
7. Your day begins at 8 am; 7 am for multi-disciplinary conferences. Generally, you will be finished at 5 pm.
8. Vacation is strongly discouraged during this rotation.
POLICIES AND PROCEDURES

MISCELLANEOUS

1. Before checking a case with a staff radiologist:
   a. Obtain a history
   b. Compare study to prior relevant studies
   c. Review prior reports
   d. Review the case carefully and complete assessment
   e. Develop reasonable diagnosis and/or differential diagnosis
   f. Determine which, if any, additional studies may be helpful for problem solving

2. Call reports of significant findings directly to referring physicians. Examples: free intraperitoneal air in a patient who has not had abdominal surgery, pneumothorax, and intracranial bleed.

3. Assist referring physicians with study interpretation at night.

4. Carry pager at all times when on duty. (Residents are responsible for pagers assigned to them. Notify Graduate Medical Education Office of any lost or damaged pager.)

5. Do not leave valuables unattended.

6. Submit all receipts for out-of-town travel to the Graduate Medical Education office. The hospital maintains strict requirements for certain travel activities and documentation of all travel to obtain reimbursement. (See Travel Policy).

7. You may read your residency file at any time. The file must stay in the Graduate Medical Education Office.

8. Check and dictate any studies you have completed before you leave for the day. If you have a study, such as a SBFT, which is still in process at the close of the day, you must discuss the case with the on call and/or swing resident and leave a detailed note before you leave.

9. You are required to maintain BLS certification, ACLS certification is recommended.

10. Program specific requirements are available at www.acgme.org

11. Please remember that your handwritten notes about cases, saved images, computer-generated lists, and work logs may contain identifiable patient information. This patient health information MUST be kept confidential.
ELIGIBILITY CRITERIA

Prior to beginning this residency in Diagnostic Radiology, the resident will have successfully completed a year of clinically oriented graduate medical education. The PGY-1 year must be spent:

1. ACGME or RCPSC or equivalent organization accredited program in internal medicine, pediatrics, surgery or surgical specialties, obstetrics and gynecology, neurology, family medicine, emergency medicine, or any combination of these OR a transitional year accredited by the ACGME or equivalent organization.

2. During the clinical year, elective rotations in diagnostic radiology must occur only in departments with an ACGME-accredited diagnostic radiology residency program and cannot exceed two months.

3. The program director is responsible for verifying that the resident accepted into the diagnostic radiology program has successfully completed the clinical year.

In addition, residents must meet eligibility requirements as outlined in the INTEGRIS Graduate Medical Education handbook regarding licensure, etc.

Resident transfers: Before accepting a resident who is transferring from another program, the program director must obtain written or electronic verification of previous educational experiences and a summative competency-based performance evaluation of the transferring resident.
DUTY HOURS

INTEGRIS Health Hospitals, through the Graduate Medical Education Committee provides ongoing oversight of the work environment of residents and specifically of the compliance of the residency programs with the accreditation requirements of the ACGME or AOA as applicable.

The Graduate Medical Education Committee will oversee the program specific implementation of the Duty Hour Requirements of the Common Program Requirements of the ACGME, the Policies and Procedures for Residency Training of the AOA and the implementation of any additional program specific requirements of any specific Review Committee of the ACGME, or specialty affiliate of the AOA, as applicable.

It shall be the responsibility of the Program Director to establish program specific policies, rotations, and call schedules consistent with the duty hour requirements of the ACGME, the AOA and applicable Review Committee of the ACGME or AOA specialty affiliate. The duty hour requirements must apply to all institutions through which residents rotate. Appropriate back-up support must be available when patient care responsibilities are especially difficult and prolonged.

Duty Hours are defined by the ACGME as follows:

“...All clinical and academic activities related to the residency program, i.e. patient care (both inpatient and outpatient), administrative duties related to patient care, the provision for transfer of patient care, time spent in-house during call activities and scheduled academic activities, such as conferences. Duty hours do not include reading and preparation time spent away from the duty site.”

The ACGME common program requirements and the AOA policies and procedures for residency training include the following duty hour requirements:

1) Residents must be scheduled for no more than 80 hours per week, averaged over a four-week period, inclusive of all in-house call activities and all moonlighting. The four-week period applies specifically to four week blocks and is not a “rolling four week average”.
2) Residents must have at least one full day (24 hours) out of seven free of patient care responsibilities, including with no assigned call activities, averaged over a four-week period.
3) Residents must be assigned call duties no more frequently than every third night averaged over a four-week period.
4) Night float must be scheduled for no more than 6 consecutive nights.
5) Continuous time on-call must be limited to 24 hours, with an additional 4 hours maximum for transfer of care, continuity of care arrangements (both inpatient and outpatient), educational debriefing, and didactic activities.
6) Residents must not assume responsibilities for new patients or any other new clinical care activities after the 24-hour period noted in 5) above. “New patient” is defined by each Review Committee in Program Specific Requirements.
DUTY HOURS (CONTINUED)

7) Minimum Rest Period: ACGME PGY1 residents should have a minimum of 10 and must have a minimum of 8 hours off between duty hour periods. ACGME Intermediate Level Residents (RRC defined) should have a minimum of 10 hours and must have 8 hours off between duty hour periods and must have a minimum of 14 hours off following 24 hour call. ACGME Upper Level Residents (RRC defined) may have more extended work duty hour periods and returns to the hospital in less than 8 hours if required to address patient care needs. All extensions and returns must remain within the 80 hour work week and include one day in seven free of patient care. AOA Residents must have a minimum of 12 hours off duty and call following a 20-24 hour shift, and 10 hours off following a 12-19 hour shift.

8) For residents who take call from home, hours spent in the hospital must be counted in the weekly duty hour totals noted above. Call from home is not subject to every third night limitation, but is subject to the 24 hour off per 7 days limitation defined in 2) above. At home call must however be reasonable. Excessive service demands and/or excessive resident fatigue will require adjustment to at home call schedules. Returns to the hospital do not trigger a new “off duty period”.

9) Time spent in patient care activities outside the residency program (i.e. moonlighting) also counts toward the duty hour totals noted above.

10) Duty hour shifts during Emergency Medicine rotations will be no longer than 12 hours, with 2 additional hours for the transfer of care and educational activities.

11) The Graduate Medical Education Office and/or specific Residency Program Office will provide all call schedules to the applicable institutional staff.

It shall be the responsibility of the Program Director to monitor residents for the effects of sleep loss and fatigue, and to respond when fatigue may be detrimental to resident performance and well being, or may affect patient care. Back-up support and/or schedule changes must be implemented to address undue resident fatigue. The supervising faculty member, in consultation with the Program Director, as indicated, may adjust downward an individual work schedule of a resident who appears excessively fatigued. Taxi vouchers to transport a resident to his/her home are available through the Residency Coordinator of the applicable residency program upon request for any post call residents.

The Graduate Medical Education Committee will oversee the implementation of duty hour requirements noted above and will perform additional activities as noted below to promote patient safety and an appropriate educational and work environment for residents.

1) Monitor, through a structured process, program specific duty hour compliance. Review program adjustments needed/made to remain in compliance with duty hour requirements.

2) Provide an annual report to the Medical Executive Committees of INTEGRIS Baptist Medical Center, INTEGRIS Southwest Medical Center and INTEGRIS Bass Baptist Health Center and the Boards of Directors of the facilities of program specific compliance with duty hour requirements and any recommendations concerning actions needed to bring specific programs into compliance with the requirements.
DUTY HOURS (CONTINUED)

3) Establish and oversee the implementation of a moonlighting policy (See the Moonlighting Policy).

4) Oversee program specific monitoring of the effect of moonlighting on resident performance (It shall be the responsibility of the Program Director to establish and maintain the program specific monitors of moonlighting and to withdraw approval for moonlighting if resident performance is negatively affected).

5) Evaluate home call requirements as needed to avoid unnecessary service demands and resident fatigue.

6) Establish a system to educate faculty and residents concerning the effects of sleep deprivation, the signs of fatigue, and process changes possible to prevent and/or manage fatigue. It shall be the responsibility of the Program Director to adopt fatigue mitigation processes appropriate for the specific residency program.

7) Review the availability of faculty to provide supervision / consultation for residents as needed specifically to avoid undue fatigue and to provide safe patient care.

8) Establish any needed additional institutional policies and procedures required to monitor and support the physical and emotional well-being of residents, to promote an educational environment and associated patient safety.

SUPERVISION AND RESIDENT RESPONSIBILITIES

1. The faculty is responsible for the quality of resident teaching and the quality of patient care. The Program Director is responsible for oversight of the faculty. Faculty members on call at night will be immediately available by pager, cell phone or home phone number. These numbers will be readily available to the residents on after hour’s duty. The faculty call schedule will be available to the residents.

2. No resident is to perform any procedure without staff supervision until he/she has demonstrated competence in doing that procedure under staff supervision.

3. Major vascular/interventional procedures (including, but not limited to, arteriograms, biliary drainage procedures, CT or ultrasound guided biopsies, abscess drainages and nephrostomies) will be performed only under the direct supervision of the staff. Progressively increasing responsibility will be given to the resident. Prior to performing an arteriogram, the resident will review the patient’s medical record and discuss the objectives with the staff radiologist. The staff radiologist and resident will both attend the arteriogram. The resident will dictate the case following discussion with the staff.

4. Myelograms, arthrograms, and other invasive procedures will also be performed under the direct supervision of the staff.
SUPERVISION AND RESIDENT RESPONSIBILITIES (CONTINUED)

5. No other procedure including but not limited to UGI, BE, IVU, will be performed by a resident without supervision until the resident has observed the procedure multiple times, fully understands the procedure, and has performed the procedure competently while supervised. Progressively graded responsibility will be given to the resident. Initially, all residents observe fluoroscopy; after becoming familiar with the positions and routines, the resident will perform fluoroscopy with another physician in the room. Subsequently the resident will perform the procedure independently then review it with staff.

6. Each resident will have a minimum of twelve (12) full months in the program before being assigned to night independent duty. However, no one will take night call if the Program Director feels he/she is not ready. Each resident will take an exam before taking call. Before taking call each resident will spend several early evenings in the hospital to learn routines and observe the call resident at work.

7. There are three staff radiologists on call, one on general radiology one on vascular/interventional radiology, and one on interventional stroke call. Each will be immediately available by pager, cell phone or home phone number. The vascular/interventional staff radiologist will come in for all vascular/interventional procedures. The general staff radiologist will come in when requested and will have a teleradiology setup at home. The resident is responsible to call the attending for any question, which requires clarification before morning for appropriate patient care.

8. At night and during certain other times, a resident may render a preliminary report when the resident is confident about the diagnosis, and the case is appropriate to his/her level of training and experience. However, **all** studies will be checked as soon as is practical by the staff and never later than the morning after the night on call. The resident is responsible to call the staff radiologist for any question, which should be answered prior to morning to ensure safe patient care.

9. If the attending report is different from the resident preliminary report, the resident must call the amended report to the patient’s physician.

10. No final report will be issued until the staff radiologist has reviewed the images.

11. The staff in charge of a subject area will develop guidelines for performing procedures; the guidelines may include written curricula, manuals, handouts, conferences, and other training materials.

12. Senior residents are expected to act in a supervisory and teaching capacity toward the junior residents and medical students.
SUPERVISION AND RESIDENT RESPONSIBILITIES (CONTINUED)

13. Residents will have faculty assess their performance on common and anticipated procedures. These assessments will be documented on forms created for this purpose. These forms are available in the GI closet and online on New Innovations. Once these forms have been completed, the resident must place them in his or her learning portfolio under “Patient Care” and these forms are also to be given to Shannon Thompson for inclusion in the resident’s file.

Following documented competence, direct supervision is not required for the following:

- Performance of diagnostic LP
- Performance of thoracentesis
- Performance of paracentesis
- Placement of PICC line

14. Residents’ abilities will be evaluated based on specific criteria. When available, national standards-based criteria will be used. It is anticipated that as “Milestones” criteria are developed by the Review Committee for Diagnostic Radiology and ABR, that those criteria will form the basis of evaluation.

Guidelines for circumstances and events in which residents MUST communicate with appropriate supervising faculty members, as related to patient care/ procedural skills

Residents must communicate in a timely fashion with appropriate supervising radiology faculty members when:

1. The resident is performing a diagnostic lumbar puncture, paracentesis, thoracentesis, or placement of PICC line. Other interventions would be performed only under direct supervision of a supervising faculty member
2. The resident is aware of a complication or possible complication of a radiology diagnostic or interventional procedure
3. The resident is aware that a patient is having or may be having a contrast reaction
4. The resident is aware that a patient has fallen or may have fallen or had a similar source of potential injury in the department
5. A nonradiology faculty member requests faculty radiology involvement, despite the best efforts of the resident to meet the physician’s expectations
6. The resident has a question which will or could directly impact patient care and the resident is unable to resolve the issue in a timely fashion without faculty assistance
7. The resident should not hesitate to contact appropriate supervising faculty if patient safety is at issue
MOONLIGHTING

First-year residents are not permitted to moonlight during the first six months of residency.

Requests to moonlight will be reviewed on an individual basis. As a general guideline, the resident will be expected to be progressing as appropriate for his/her level of training. First-year residents will also be expected to score above 50% on the in-service exam.

All moonlighting must be approved in advance in writing by the Program Director. The moonlighting request form can be found on New Innovations.

**Hours spent moonlighting must be documented (on New Innovations) and are included in the Duty Hour restrictions and are counted towards the 80 hour maximum weekly hour limit.**

Moonlighting is a privilege. The residency committee may withhold or suspend moonlighting privileges should patient safety or resident education be compromised. The residency committee has the right to withhold permission to moonlight.

See INTEGRIS Graduate Medical Education Handbook for additional information.

USE OF RESIDENCY LIBRARY MATERIALS

The Radiology Residency Library includes a large number of texts, journals, videotapes, slide sets, CDs, and DVDs. Materials available in the library should be used in the library. Certain educational resources (particularly CDs and DVDs) and computer equipment are maintained in the Graduate Medical Education office, and must be checked out through the Residency Coordinator. Borrowed CDs, DVDs, or computer equipment must be returned to the Graduate Medical Education office.
SCHOLARLY ACTIVITY REQUIREMENT

The Accreditation Council for Graduate Medical Education requires that all residents participate in scholarly activity during the residency program.

Residents will receive training in critical thinking skills and research design through lectures and journal club.

All residents MUST complete a scholarly project with a faculty mentor. Scholarly activity may take the form of a publication (book chapter, publications in peer-reviewed journals, and online publications, such as “ACR Case in Point”) or presentation at a local or national meeting. The activity may focus on laboratory research, clinical research, the analysis of disease processes, imaging techniques or practice management issues.

The results MUST be published or presented at institutional, local, regional or national meetings.

The program does provide support such as access to the medical library, librarian assistance, physicist assistance and/or statistical assistance as needed.

The results of the scholarly activity must be included in the resident’s learning portfolio for evaluation.

A routine part of the residency includes case presentations at various conferences: Radiology/Pathology, for example. Presentations should be concise thorough summaries of the patient or issue under discussion

Occasionally residents may be required to give longer lectures on various radiology topics. Upper level resident training and supervision of lower level residents and medical students is a requirement for all residents.
Journal club will be scheduled once a month, every month. Every month, a staff member will be assigned to proctor journal club, and a resident or residents will be assigned to select and present journal articles for discussion.

The resident assigned to journal club will consult with the assigned staff radiologist to select an appropriate article to be presented. After the journal article has been agreed upon, the article is to be distributed to the other residents as soon as possible, but no later than seven days prior to the conference. It is expected that all residents will have carefully read the articles prior to the conference.

Goals of journal club:

- Acquire, disseminate, and apply new medical information
- Teach and assess critical appraisal skills for reading and writing a scientific paper
- Promote lifelong learning skills in evidence-based medicine
- Improve reading habits
- Provide an interactive and social opportunity for peer-to-peer learning
- Improve small group participation, presentation and communications skills
- Emphasis on original research articles, but good review articles also accepted
- Discussion of statistics and principles of evidence-based medicine
- Active participation with interactive discussion format

Standardized Checklist of Review Criteria

1. What type of study is this article? (consult the definitions in glossary of study design at http://www.ajo.com)
   a. Randomized or non-randomized clinical trial
   b. Interventional case series or case report
   c. Cohort study or case-controlled study
   d. Cross-sectional study
   e. Observational case series or case report
   f. Experimental study
   g. Meta-analysis of literature

2. Review the manuscript sections
   a. Title: Is the title accurate, concise, and complete?
   b. Introduction: Are the purposes of the study, the research rationale, and the hypothesis described? Is the pertinent literature reviewed and cited accurately?
3. Design
   a. Methods: Is the description of the study methodology accurate, complete and appropriate? Does the method section inadvertently contain results or discussion? Do the methods adequately describe:
      i. Setting (multi-center, institutional, referral, academic, or clinical practice)
      ii. Patients or study population including patient numbers, one or both sides of the body, selection procedures, inclusion/exclusion criteria, randomization, allocation and masking
      iii. Intervention or observation procedure(s): (treatments and controls)
      iv. Main outcome measures (primary, secondary, other).
   b. Human Subject Participation in Experimental Investigations: Does the manuscript describe the approval from the appropriate Institutional Review Board (IRB) or equivalent monitoring agency? Was appropriate informed consent obtained from the patients or subjects?
   c. Use of Animals in Biomedical Research: Does the manuscript describe the animal care protocol, name the institution that sponsored the study, and identify relevant IRB approval? Does the research conform to the generally accepted principles of animal maintenance and care?
   d. Statistics: Was the statistical analysis valid? When P values are used, is the actual P value (for example P=.032) provided or is an inequality used (for example, P<.05)? In the reporting of the basic summary statistics, are the mean and standard error, as well as the confidence limits, provided to help the reader understand the conclusions of the study? Are the statistical models used (analysis of variance, covariance, multiple regressions) specified?
   e. Results: Are the outcomes and measurements provided in an objective sequence? Are the data provided in a clear and concise manner? Do the tables and figures accurately summarize the data or add to the information presented in the text? Does the data report confidence intervals (usually at the 95% interval) and exact P values or other indications of statistical significance?
   f. Discussion: Does the discussion accurately describe the results? Does it identify any statistically or clinically significant limitations or qualifications of the study? Do the authors accurately state the conclusions of the study? Are there overgeneralizations or undue speculations in the discussion? Is equal emphasis given to positive and negative findings?

Some material adapted from ACGME Bulletin
LEARNING PORTFOLIO

Each resident is required to maintain their individual learning portfolio in the binders provided by the program. Each resident must keep the portfolio up to date, and bring it for review by the program director at each six month evaluation with the program director.

The learning portfolio must document, at a minimum:

1. Patient Care and Procedural Skills
   a. Case/procedure logs
   b. ACGME log print outs
   c. I-131 logs
   d. Mammography logs

2. Medical Knowledge
   a. Documentation of conferences attended, courses/meetings attended, self-assessment modules completed, etc
   b. Documentation of compliance with regulatory-based training requirements in nuclear medicine and breast imaging
   c. Documentation of performance on yearly in-service examination

3. Practice-Based Learning and Improvement
   a. Annual resident self-assessment and learning plan

4. Interpersonal and Communication Skills
   a. Formal evaluation of quality of dictated reports

5. Professionalism
   a. Documentation of compliance with institutional and departmental policies (e.g. HIPAA, JCAHO, patient safety, infection control, dress code, etc.)
   b. Status of medical license

6. Systems-Based Practice
   a. Documentation of a learning activity that involves deriving a solution to a system problem at the departmental, institutional, local or national level

7. Scholarly Activities
   a. Documentation of scholarly activity, such as publications, announcement of presentations, etc.

8. Other
   a. Any materials pertinent to the educational experience of residency training.
CONFERENCES

1. Attendance at conferences is required except when post-call, on vacation, on interventional/angiography or PEDS, at Children’s Hospital, ICIO or AIRP rotation. Attendance at conferences is considered in your evaluation. The Chief Residents will prepare a list of conferences each month. Conferences are designed to enhance the clinical education of the residency.

2. Residents are required to present cases at interdisciplinary conferences.

3. Resident attendance in conferences will be documented.
NEW INNOVATIONS PROCEDURE LOGS

Types of studies and procedures to be logged

Vascular/Interventional procedures, including biopsies and drainages

ACGME RESIDENT CASE LOGS

Your ACGME case log MUST be kept updated. Your case logs will be compared to others in your class and other residents of your level from previous years. Your case log numbers are expected to be similar in number or greater in number than your peers.

Also, please be advised that the program director will do random checks of work production by searching the PACS system. Residents should attach their names to studies they dictate on the PACS system.

Residents who are not on vacation, at conference, at AIRP, sick, on post-call days of the emergency rotation, or otherwise legitimately excused MUST participate in patient care EVERY DAY. This is a requirement that is based on Medicare requirements. This work must be documented, whether by attaching your name to studies on PACS or keeping logs of VIR procedures or mammography cases, etc. This requirement is related to the core competencies of patient care and professionalism.

The average first year resident has 1247 cases on the ACGME case log.
The average second year resident has 2437 cases on the ACGME case log.
The average third year resident has 1378 cases on the ACGME case log.
The average fourth year resident has 1861 cases on the ACGME case log.

Data from the ACGME indicates that the average graduate from a diagnostic radiology residency program will have read 9000 examinations. It is expected that our residents’ work experience will meet or exceed that number.
ACGME RESIDENT CASE LOGS (CONTINUED)

Online ACGME Case Logs:

Examinations:
Chest Radiograph (71010, 71020-23, 71034-35)
CT Abd/Pel (72192-94, 74150, 74160, 74170, 74176-78)
CTA/MRA (71275, 71555, 72191, 72198, 74175, 74185, 70545-49, 70496, 70498, 73725, 73706)
Image Guided Biopsy/Drainage (75989, 76942, 77012)
Mammography (77055-57, G0202, G0204, G0206)
MRI Body (71550-52, 72195-97, 74181-83)
MRI Brain (70551, 70552, 70553)
MRI Knee (73721, 73722, 73723)
MRI Spine (72141-42, 72146-49, 72156-58)
PET (78491-92, 78608, 78609, 78811-16)
US Abd/Pel (76700, 76770, 76830, 76830, 76856, 77)

The Resident Case Log System for Operative Log Reporting is an Internet based case log system utilizing CPT codes and ICD9 codes to track resident experiences. The Residency Review Committee (RRC) has indexed these codes into categories for evaluation. All valid CPT and ICD9 codes have been added to the ACGME Resident Case Log System. RRC identifies the codes that pertain to the specific specialty, and chooses the category in which it counts (area and type). Those codes that the RRC is not tracking at this time are placed into an area and type called miscellaneous or unassigned and will display on the reports as “miscellaneous” or “unassigned”.

The resident should enter encounters/procedures and choose codes that accurately reflect the encounter/procedure performed or the code that most closely matches the procedure done. Some entries may fall into the unassigned category. You can generate a full detail report on a weekly or monthly basis to review the unassigned procedures to make sure that they are being reported correctly. When you run the report, choose the appropriate resident and in the area select “unassigned”. The residents also have this capability so they can run the report as well (see report section for more details).

Any valid code can be entered into the application, but only those codes the RRC has selected will be counted for experience.

While some programs prefer to have administrative personnel enter resident experience, this application was designed to allow residents to enter data on a regular basis at their convenience. Entry can be done on the internet at any time 24 hours a day.

The site is secured by encryption certificates obtained through the Verisign Corporation and is backed up daily.
LEAVE TIME

Please see the INTEGRIS Graduate Medical Education Handbook regarding information about leave. In addition note the following:

1. The timing of leave is at the discretion of the Program Director.
2. Emails must be completed and approved by the Chief Residents. Request leave by emailing the Chief Residents. The Chief Residents will reply to the email with approval and copy the residency coordinator and medical education manager.
3. Residents taking leave are responsible for notifying appropriate staff members of their absence.
4. Leave is generally not allowed during the rotation at Children’s Medical Center of Dallas.
5. Any leave taken during the Children’s Hospital of Oklahoma rotation must be arranged in advance with the Facility Program Director and with the Chief Residents at INTEGRIS Baptist Medical Center.
6. Leave is limited in June and July.
7. Leave is not allowed during the ACR – In Training Examination. In addition, leave is limited when residents are taking any exams. See “Examinations” for exam dates.
8. Requests for leave time must be received by the GME office no later than the Friday prior to the week for which the vacation is requested. No requests will be approved retroactively. Violations will be referred to the program director. Compliance with this policy reflects the core competency of professionalism.

ON-CALL ROTATION

There will be in-house resident coverage 24 hours a day 7 days a week.

On the weekday following a night shift, the resident may leave after cases are checked and dictated and any other responsibilities are completed.

The resident may not leave the hospital grounds while on call unless directed to do so by the staff radiologist on call. While on call, the resident must be immediately available by phone. Residents are not to send other residents home before their shifts are over without staff permission.

Night Call:

Be professional. Treat patients, support staff, technicians, colleagues, attendings, and referring physicians with respect. The role of the physician is to provide care for the patient. When working at night, offer to help the physician interpret radiographs even before they ask.
ON-CALL ROTATION (CONTINUED)

Preliminary reports on call:

It is recommended that preliminary reports of on call studies be dictated by the on-call resident in Powerscribe as soon as reasonably possible after the report is called. Please be sure to include in this preliminary report to whom the report was called and when. After this preliminary dictation is completed, please click the “Approve” button. This will allow access to your preliminary report to other interested parties (and hopefully will decrease the number of phone calls made to you about the exams you have seen).

In the check-out session with your staff, show the staff member your preliminary dictation as you go over the images. If minor corrections to your report (such as minor changes in wording, correction of typographical errors, etc) are advised by your staff member, it is acceptable for these corrections to be made in the preliminary report before the staff member signs the report on his or her queue.

On the other hand, in those uncommon situations in which there IS a significant difference in the interpretation of the preliminary report and the final report, follow this procedure: The preliminary report is NOT to be substantially altered. Instead, the resident will call the patient’s attending physician and discuss with them the new interpretation. AT THE BOTTOM OF THE PRELIMINARY REPORT ALREADY DICTATED, dictate the new interpretation and document to whom this revised report was called and when.

The rationale behind this process is to ensure an accurate reflection of the content of preliminary reports and also to provide an accurate timeline of what was said to whom and when.

Additional comments:

1) To complete preliminary report when on call, write your impression, to whom you spoke, and the approximate time of your verbal report on the information box on PACS.

2) Residents MAY NOT pay other residents to take call.

3) All meals are free for residents at INTEGRIS Baptist Medical Center when on call.

Staff log for significant on call report discrepancies:

A simple log sheet will be placed at the read-out stations for the purpose of monitoring the incidence of “significant differences” between staff and resident on call dictations. You are responsible for telling staff the total number of on call cases. Staff will fill in the rest.
ALERTNESS MANAGEMENT/FATIGUE MITIGATION

Residents and faculty will receive ongoing training in fatigue and its effects, mitigation and management. Primary teaching tools will be the LIFE and SAFER curricula.

Residents who are scheduled to be on call may elect to use the hour from 4 to 5 pm to take a nap, if they feel fatigued.

Should a resident become unable to perform his or her duties due to impairment from fatigue or illness, he or she is immediately excused from duty. Should this occur during the night float rotation, the resident on short call that night will come in as backup. Should this occur during short call, the night float resident will come in early.

The hospital will provide taxi service to residents who are too fatigued to drive home safely. It is the resident’s responsibility to make that determination. If necessary, this can be coordinated through the GME office.
CHIEF RESIDENTS

Co-Chief Residents from March 1, 2014 to February 28, 2015:
Joshua Jansen, MD and Nicholas Armstrong, MD

DUTIES OF CHIEF RESIDENT

1. Arrange coverage for residents on leave.
2. Write call schedule. All call schedules must be written in accordance with Program and Institutional policy, and submitted to the Residency Coordinator by the 10th of the month prior to call schedule month.
3. Assign short evenings with the on call resident toward the end of the first year.
4. Write monthly lecture schedule. All lecture schedules must be submitted to the Residency Coordinator by the 10th of the month prior to the schedule month.
5. Serve as a role model and mentor for junior residents.
7. Assist in management of resident activities (e.g. maintenance of logs).
8. Facilitate communication between residents and staff physicians.
9. Assist the Program Director in the communication of new policies and procedures to all residents.
10. Facilitate communication between and resolve minor disagreements between residents.
11. Promote an academic environment.
12. Chief resident or his/her designated alternate must attend the GMEC meeting. The GMEC meeting is held in the Bennett Room at 7 am the second Thursday of the month except July.

PROCESS TO DEAL CONFIDENTIALLY WITH RESIDENT PROBLEMS OR CONCERNS

Please feel free to discuss any residency related issue with your program director. Alternately, residents may approach any staff member of the residency committee, any faculty member, Shannon Thompson, Annette Kezbers, or Dr. Shirley Dearborn through the GME office. These channels will almost always allow for dealing with issues that may arise. Residents who feel their concerns have not or cannot be addressed through these channels may contact Dara Wanzer in the Legal Department.

Residents may also contact the President of INTEGRIS Mental Health, a psychiatrist, who has agreed to serve as independent confidential consultant for residents.

Consultations provided by the President of INTEGRIS Mental Health will be informal and will not be considered a formal psychiatric evaluation or psychiatric care.

To schedule an appointment, the resident should call (405) 717-9800.
EVALUATIONS AND RESIDENT ADVANCEMENT

RESIDENTS:
Residents will be evaluated using objective tools in each ACGME-identified competency. Multiple evaluators will be used.

Each resident will receive a competency based evaluation at the end of each rotation.

Each resident will have a documented semi-annual evaluation of performance. This evaluation will include:
- Global faculty evaluation (all competencies)
- 270 evaluations of interpersonal skills/communication skills and professionalism
- Learning portfolio (please see handbook section regarding learning portfolio)

The residents’ case logs will also be reviewed.

The residents’ files including their evaluation material is available for resident review any time the GME office is open. Rotation evaluations are available for resident review online at any time.

Residents will be advanced to positions of higher responsibility only on the basis of their satisfactory progressive professional growth and scholarship. Residents experiencing performance difficulties or receiving unfavorable reviews will receive more frequent reviews of performance. Please see the INTEGRIS Graduate Medical Education Handbook for details regarding the processes used for residents experiencing performance deficiencies.

At the end of training, the program director must provide a summative evaluation which will become a part of the resident’s permanent record. This evaluation will include information regarding the resident’s performance during the final period of training and verify that the resident has demonstrated sufficient competence to enter practice without direct supervision.

FACULTY:
At least annually, the program will evaluate faculty performance as it relates to the program. This evaluation will include review of the faculty members’ clinical teaching abilities, commitment to the educational program, clinical knowledge, professionalism and scholarly activities. The evaluation will also include annual written confidential evaluations by the residents.
EVALUATIONS AND RESIDENT ADVANCEMENT (CONTINUED)

Faculty specifically will be evaluated on:

- Availability
- Adequate review of and feedback concerning the resident’s work
- Response when contacted during resident’s on-call period
- Clinical knowledge and skills
- Familiarity with current literature
- Function as a role model
- Ability to stimulate interest and learning
- Frequency of rounds (check-out)
- Directive versus coaching role
- Skill and guidance in procedural areas

The program director must provide each faculty member with an annual evaluation. The evaluation will include an assessment of clinical knowledge, teaching ability, commitment to the program, and scholarly activity. Anonymous, summative information obtained from the residents’ evaluation will be included.

PROGRAM EVALUATION AND IMPROVEMENT:

The program will conduct a formal, systematic evaluation of the curriculum annually. Other areas which will be tracked include: resident performance, faculty development, graduate performance, including performance on the ABR examinations, and program quality.

The faculty and residents will have the opportunity to evaluate the program confidentially and in writing at least annually.

The results of the faculty and resident assessments will be used with other program performance indicators to identify areas in need of improvement. If deficiencies are found, a written plan of action to address the performance issues will be developed. This action plan will be reviewed by the faculty and documented in the meeting minutes.
DIAGNOSTIC RADIOLOGY MILESTONE PROJECT

The Milestones are designed only for use in evaluation of resident physicians in the context of their participation in ACGME accredited residency or fellowship programs. The Milestones provide a framework for the assessment of the development of the resident physician in key dimensions of the elements of physician competency in a specialty or subspecialty. They neither represent the entirety of the dimensions of the six domains of physician competency, nor are they designed to be relevant in any other context.

MILESTONE REPORTING

The milestones are designed for programs to use in semi-annual review of resident performance and reporting to the ACGME. Milestones are knowledge, skills, attitudes, and other attributes for each of the ACGME competencies organized in a developmental framework from less to more advanced. They are descriptors and targets for resident performance as a resident moves from entry into diagnostic radiology residency through graduation. In the initial years of implementation, the Review Committee will examine milestone performance data for each program’s residents as one element in the Next Accreditation System (NAS) to determine whether residents overall are progressing.

For each reporting period, review and reporting will involve selecting the level of milestones that best describes each resident’s current performance level in relation to milestones. Milestones are arranged into numbered levels. Selection of a level implies that the resident substantially demonstrates the milestones in that level, as well as those in lower levels. A general interpretation of levels for diagnostic radiology is below:

Level 1: The resident demonstrates milestones expected of one who has had some education in diagnostic radiology.

Level 2: The resident is advancing and demonstrating additional milestones.

Level 3: The resident continues to advance and demonstrate additional milestones; the resident consistently demonstrates the majority of milestones targeted for residency.

Level 4: The resident has advanced so that he or she now substantially demonstrates the milestones targeted for residency. This level is designed as the graduation target.

Level 5: The resident has advanced beyond performance targets set for residency and is demonstrating “aspirational” goals, which might describe the performance of someone who has been in practice for several years. It is expected that only a few exceptional residents will reach this level.
DIAGNOSTIC RADIOLOGY MILESTONE PROJECT (CONTINUED)

Additional Notes

Level 4 is designed as the graduation target but does not represent a graduation requirement. Making decisions about readiness for graduation is the purview of the residency program director (see the following NAS FAQ for educational milestones on the ACGME’s NAS microsite for further discussion of this issue: “Can a resident graduate if he or she does not reach every milestone?”). Study of milestone performance data will be required before the ACGME and its partners will be able to determine whether Level 4 milestones and milestones in lower levels are in the appropriate level within the developmental framework, and whether milestone data are of sufficient quality to be used for high stakes decisions.

Answers to Frequently Asked Questions about the NAS and milestones are available on the ACGME’s NAS microsite: http://www.acgme-nas.org/assets/pdf/NASFAQs.pdf.

VENDOR POLICY FOR RADIOLOGY RESIDENTS

On occasion, vendors may provide educational materials to the residents, provided that:

1. The educational materials provided are of scientific merit and pertain to the practice of radiology

2. They provide information about imaging, contrast agents, or disease process, etc. in a manner with no bias toward a particular vendor’s product.

3. Any materials provided will have disclosures regarding financial relationships between the authors of the materials and the vendor’s company.

4. All vendor/resident contacts are approved in advance by the program director.

Unsolicited gratuities

PROFESSIONALISM

The program director and institution must ensure a culture of professionalism that supports patient safety and personal responsibility. Residents and faculty members must demonstrate an understanding and acceptance of their personal role in the following:

Assurance of the safety and welfare of patients entrusted to their care

Provision of patient- and family-centered care

Assurances of their fitness for duty

Management of their time before, during, and after clinical assignments

Recognition of impairment, including illness and fatigue, in themselves and in their peers

Attention to life-long learning

The monitoring of their patient care performance improvement indicators

Honest and accurate reporting of duty hours, patient outcomes, and clinical experience data

Responsiveness to patient needs that supersedes self-interest including when appropriate the transition of that patient’s care to another qualified provider

By signing below, I demonstrate my understanding and acceptance of my personal role in the above values.

____________________________________________
Signature

____________________________________________
Date
Requirements

Five years of approved training

- One year in clinical training

The first postgraduate year must be ACGME- or RCPSC- accredited clinical training in internal medicine, pediatrics, surgery or surgical specialties, obstetrics and gynecology, neurology, family practice, emergency medicine, transitional year, or any combination of these. Credit for accredited training in other specialties may be granted on an individual basis after submission of the appropriate documents to the ABR.

If there is an elective in diagnostic radiology, it must be in a department with an ACGME-approved diagnostic radiology residency program and cannot be longer than two months. No more than a total of three months may be spent in radiation oncology and/or pathology.

- Four years in a diagnostic radiology program

The program must be approved for training in diagnostic radiology by the Review Committee (RC) for diagnostic radiology of the ACGME, or by the RCPSC (Canada).

- A minimum of four months of the four-year diagnostic radiology training program must be spent in nuclear medicine.
  (See Nuclear Medicine 2004 Training Update.)
- A minimum of three months must be spent in mammography/breast imaging.
- No more than 16 months may be spent in any one subspecialty or in research. Those considering careers in research may want to participate in the Holman Research Pathway.

- Obtain certification within the six-year Board Eligibility period

At the completion of training, the ABR officially recognizes candidates as “Board Eligible” for a period of six full calendar years, through December 31 of the sixth year. Certification must be acquired during this time. Please see the Board Eligibility Policy for further details.

- Graduate from an accredited U.S. or Canadian diagnostic radiology residency training program.
pass the ABR Core and Certifying examinations. A resident is eligible to take the Core Examination in the 36th month of diagnostic radiology training, and must take the examination at the first administration offered. A candidate who has begun training at a date other than July 1 is eligible to take the Core examination after 36 months of training and must take the examination at the first administration offered after eligibility is attained. Any delay requires application for an exception and approval by the ABR. Please contact the ABR office at 520-790-2900 or icnotification@theabr.org for specific procedures for requesting an exception. In the fifteenth month after the completion of diagnostic radiology residency training, a candidate is eligible to take the Certifying Examination.

TRANSFER

You are expected to remain in the same program for all four years. If you wish to transfer for any reason, that transfer must be approved by the initial program director with whom you have successfully completed the training. A listing of the specific rotations is required. This training also must be accepted by the new program director. If a program director states that a resident has not successfully completed training, that statement must have the signatures of two other faculty members from the same program, supporting the claim of unsatisfactory completion.

LEAVE OF ABSENCE

Leaves of absence and vacation may be granted to residents at the discretion of the program director in accordance with local rules. Within the required period(s) of graduate medical education, the total such leave and vacation time may not exceed:

<table>
<thead>
<tr>
<th>Duration</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 calendar weeks (30 working days)</td>
<td>for residents in a program for one year</td>
</tr>
<tr>
<td>12 calendar weeks (60 working days)</td>
<td>for residents in a program for two years</td>
</tr>
<tr>
<td>18 calendar weeks (90 working days)</td>
<td>for residents in a program for three years</td>
</tr>
<tr>
<td>24 calendar weeks (120 working days)</td>
<td>for residents in a program for four years</td>
</tr>
</tbody>
</table>
If a longer leave of absence is granted, the required period of graduate medical education must be extended accordingly.

The ABR leave policy is based on educational requirements and is not affected by other institutional, state, or federal policies.

- CARDIAC LIFE SUPPORT CERTIFICATION
  You must have basic cardiac life support certification. Advanced cardiac life support certification is encouraged.

- HIGH MORAL AND ETHICAL STANDARDS
  You must be recognized by your peers to have high moral and ethical standards in the profession.

- PROOF OF VALID STATE LICENSURE OR CANADIAN EQUIVALENT
  For those in training, a training license is acceptable.

- PASS ALL ABR INITIAL CERTIFYING EXAMS WITHIN SIX YEARS AFTER THE COMPLETION OF TRAINING
  A candidate who has not obtained initial certification as of the sixth year after completion of training should contact the American Board of Radiology to obtain further information. Candidates who completed their training before 2009 and who have not yet obtained initial certification should also contact the American Board of Radiology for further information.

Special Circumstances

In special instances these requirements may be modified by a majority vote of the entire Board of Trustees, or by the Executive Committee of the Board acting in its stead.

Failure to Qualify

If your program director fails to indicate in writing that you will have the required training and will have achieved adequate professional qualifications before the examination, documentation of the reason(s) must be submitted, along with evidence that you have been appropriately apprised of these deficiencies. See the ABR's Appeals Policy.
AMERICAN BOARD OF RADIOLOGY (ABR) REQUIREMENTS (Continued)

Appealing a Decision

The applicant must provide the Executive Committee of the Board with a written statement supporting the appeal. The Executive Committee may ask the program director to submit a written response to the applicant's appeal.

Final Decision

Within a reasonable timeframe, the Executive Committee must reach a final decision in determining the candidate's admissibility to the examination.

Final Action of the Board

The final action of the Board is based on the applicant's professional record, training, and attainment in the field of diagnostic radiology, as well as on the results of examinations. The mission of the Board is not to prevent qualified radiologists from obtaining certificates, but to assist them in becoming recognized as men and women competent to practice diagnostic radiology.

Revocation of Certificate

Certificates issued by this Board shall be subject to revocation in the event that:

- the certificate was issued contrary to or in violation of any rule or regulation of the ABR;
- the person to whom the certificate was issued was not eligible to receive it;
- there is substantial misstatement or omission of a material fact to the ABR in an application or in any other information submitted to the ABR;
- any license of the person to practice is not, or ceases to be, a valid and unrestricted license to practice within the meaning set forth in the Rules and Regulations of the ABR (in the event a diplomate's license to practice is suspended, revoked, or restricted in any state in which the diplomate practices, holds a license, or has held a license, the diplomate's board certification may be revoked or suspended);
AMERICAN BOARD OF RADIOLOGY (ABR) REQUIREMENTS (Continued)

- there is a violation of rules and regulations relating to the Initial Qualifying, Oral, or Maintenance of Certification Examinations and applications to take the examinations;
- the person is found presenting or distributing, or aiding or assisting another person(s) to present or distribute, a forged document or other written instrument purporting to have been issued by or under the authority of the ABR to evidence that a candidate, diplomate, or any other person(s) is currently or was previously certified by the ABR, when that is not the case, or claims orally or in writing, or assists another person(s) to claim, that a candidate, diplomate, or any other person(s) is currently or was previously certified by the ABR, when that is not the case;
- the person engages in any conduct that materially disrupts any examination or that could reasonably be interpreted as threatening or abusive toward any examinee, proctor, or staff;
- there is failure to cooperate with the ABR or its Hearing Committee at any point during the investigation of a matter arising under Article X of the ABR Bylaws.

Before any such certificate shall be revoked, a notice shall be sent by registered or certified mail to the last known address of the holder of such certificate (as it appears on the records of the ABR). The notice will set forth the act, omission, or conduct alleged or complained of and will give the holder of the certificate a reasonable opportunity to answer in writing thereto. Such certificate holder shall have not less than 30 days in which to reply thereto. The Board of Trustees may at its discretion make such further investigation as it deems necessary and proper.

The Board of Trustees of this Corporation shall have the sole power, jurisdiction, and right to determine and decide whether or not the evidence or information before it is sufficient to constitute one of the grounds for revocation of any certificate issued by the Board. The decision of the Board of Trustees shall be final.

The Board reserves the right to make changes in its fees, policies, and procedures at any time and cannot assume responsibility for giving advance notice thereof.
Fees, Dates and Locations

<table>
<thead>
<tr>
<th>Year</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>October 20-21</td>
<td>Diagnostic Radiology Core Exam #2 at Chicago Exam Center, Tucson Exam Center</td>
</tr>
<tr>
<td>2014</td>
<td>November 9-10</td>
<td>Diagnostic Radiology Full and Conditioned Oral Exam in Louisville, KY</td>
</tr>
<tr>
<td>2015</td>
<td>March 2</td>
<td>Radioisotope Safety Exam (RISE) (formerly NRC AU-Eligibility Exam) administered at Pearson VUE Test Centers</td>
</tr>
<tr>
<td>2015</td>
<td>June 11-12</td>
<td>Diagnostic Radiology Core Exam at Chicago Exam Center, Tucson Exam Center</td>
</tr>
<tr>
<td></td>
<td>June 15-16</td>
<td></td>
</tr>
</tbody>
</table>

Registration and Fees

Please note that fees are subject to change.

If your residency start date is ON OR AFTER July 1, 2010

Registration Process

After you enter residency, your program director or coordinator will submit your name and email address to the ABR as a new resident in the training program.

When your information is received, the ABR will send you notification and information for logging on to your personal database (myABR) to begin the registration process.

If you have not already registered:

- Registrations are accepted by the ABR July 1 – November 30 (no fee due at time of registration).
- Registrations are reviewed by the ABR December 1 – December 31.
- Registration approval notification is sent in January of the year following your registration.

Effective January 1, 2014, your annual fee will be $625. Please note that this fee is not refundable and will be higher if you do not register in PGY2.
AMERICAN BOARD OF RADIOLOGY (ABR) REQUIREMENTS (Continued)

Annual fees are charged for every year you are in the initial certification process, beginning with your first year of residency. If you do not fully pass the Core or Certifying examination on the first administration, additional exam fees will apply.

You will be sent your annual invoice in January of each year, as long as you are in the certification process. The fee amount is subject to adjustment by the ABR each year. All fees are nonrefundable.

Additional Fees

The following tables show additional fees that may apply.

<table>
<thead>
<tr>
<th>Category</th>
<th>Diagnostic Radiology Exams</th>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>Late Registration Fee</td>
<td>Registration form not filed by due date.</td>
<td>$400</td>
</tr>
<tr>
<td>General</td>
<td>Late Payment Fee</td>
<td>Annual fee not paid by due date.</td>
<td>$100</td>
</tr>
<tr>
<td>Qualifying Exam</td>
<td>Cancellation Fee (up to exam date)</td>
<td>Cancelled appointment after registering for testing site and scheduling exam.*</td>
<td>$300</td>
</tr>
<tr>
<td>Qualifying Exam</td>
<td>Exam No-Show Fee</td>
<td>Did not appear for exam after registering for testing site and scheduling exam.*</td>
<td>$500</td>
</tr>
<tr>
<td>Oral Exam</td>
<td>Cancellation Fee - 20 days or more before exam</td>
<td>Cancelled up to 20 days before exam.*</td>
<td>$400</td>
</tr>
<tr>
<td>Oral Exam</td>
<td>Cancellation or No-Show Fee - 19 days or fewer before exam</td>
<td>Cancelled oral exam 19 days or fewer before exam or did not show.*</td>
<td>$3050</td>
</tr>
<tr>
<td>Certifying Exam</td>
<td>Cancellation (up to exam date) or No-Show Fee</td>
<td>Cancelled appointment or did not show for exam after registering for testing site and scheduling exam.*</td>
<td>$400</td>
</tr>
</tbody>
</table>
*Payment is required to continue in the certification process. Any exam fees paid for the cancelled/missed administration will be applied to the next exam attempt; however, a new annual fee may be due in the interim.

<table>
<thead>
<tr>
<th>Fee</th>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Re-exam fee</td>
<td>If you fail an exam, a re-exam fee may be assessed.</td>
<td>$750</td>
</tr>
</tbody>
</table>

Payment may be made by check, VISA™, MasterCard™, or American Express™ only. If your payment is declined for any reason, there will be a $100 processing fee.

**Reapplications for Diagnostic Radiology (DR) Examinations**

As part of our efforts to improve the certification process, the ABR has replaced the three “opportunities” for examination participation per application with time limits for board eligibility. This gives candidates more flexibility in managing their examination process.

According to the ABR’s Board Eligibility Policy, enacted in 2012, candidate applications no longer will expire due to a limited number of opportunities to take exams. Instead, candidates may continue the certification process throughout their board eligibility period.

Beginning July 1, 2013, all DR candidates out of training and in the initial qualifying / oral exam process will be charged an annual fee in order to continue participating in the certification process.* Assuming no outstanding fees are owed, one initial certifying examination may be attempted every year at no additional charge. If a second initial certification examination is taken in the same calendar year, a re-examination fee will be charged. Individuals may continue to participate in the certification process until their board eligibility period terminates. All DR candidates will be invoiced annually until certification is obtained or until board eligibility expires, whichever occurs first.

For DR, the termination dates for board eligibility status are listed in the table below.

<table>
<thead>
<tr>
<th>End of Training</th>
<th>Termination of Board Eligibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004 or before</td>
<td>December 31, 2014</td>
</tr>
<tr>
<td>2005</td>
<td>December 31, 2015</td>
</tr>
<tr>
<td>2006-2010</td>
<td>December 31, 2016</td>
</tr>
<tr>
<td>2011 and afterward</td>
<td>Six full calendar years from end of training</td>
</tr>
</tbody>
</table>
AMERICAN BOARD OF RADIOLOGY (ABR) REQUIREMENTS (Continued)

Please be aware that all initial certification fees, including but not limited to outstanding annual fees, late fees, and additional examination fees, must be paid in full before registering and participating in any ABR initial certification examination.

*Please note that in order to continue the certification process, we require all candidates to sign the Candidate and Diplomate Agreement by logging in to myABR at https://www.myabr.theabr.org.

ABR CERTIFICATES

The Certificate

As you progress through your residency, you will take examinations to qualify for your initial certification in diagnostic radiology.

If you have chosen to subspecialize, you can also take exams to qualify for subspecialty certificates in the following disciplines:

- Hospice and Palliative Medicine
- Neuroradiology
- Nuclear Radiology
- Pediatric Radiology
- Vascular and Interventional Radiology

Your certificate is valid contingent upon meeting the requirements of Maintenance of Certification (MOC).

Throughout the period for which you hold certification, you are expected to continue learning and improving your skills in a personalized program (see ABR-MOC). Your progress will be evaluated annually on a rolling three-year “look-back” window. One of the requirements to maintain certification is successful completion of the cognitive examination (MOC Part 3), which must be passed before the end of the tenth year from your previously passed examination. This is a practice-profiled, computer case-based examination. The examination is different from the current series of initial examinations for certification. Your certification status and MOC status will be publicly reported on our website, as well as at the official public reporting website of the American Board of Medical Specialties (ABMS), www.certificationmatters.org.
## Time Limitation for Attaining Initial Certification

Candidates have specific time limits for remaining eligible to be initially certified by the ABR and to maintain their status as "board eligible." Board eligibility will begin at the completion of diagnostic radiology residency training. For international medical graduates, "end of training" is defined as the end of the four-year period outlined in the Sponsoring Department Agreement.

For candidates who have already completed training, the "board eligibility" period ends according to the following schedule:

### End of Training Termination of board eligibility

<table>
<thead>
<tr>
<th>Year</th>
<th>Termination Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004 or before</td>
<td>December 31, 2014</td>
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</tr>
<tr>
<td>2011 and afterward</td>
<td>six full calendar years from end of training</td>
</tr>
</tbody>
</table>

After the period of eligibility ends, candidates failing to successfully complete the initial certification process will no longer be considered by the ABR as "board eligible," will no longer be permitted to designate themselves as such for communications or credentialing purposes, and will no longer be reported as such on the ABMS website ([www.certificationmatters.org/](http://www.certificationmatters.org/)) or in verification letters.

To return to "board eligible" status, candidates must take an additional year of training in a department with an Accreditation Council for Graduate Medical Education (ACGME)-accredited or Royal College of Physicians and Surgeons of Canada (RCPSC)-accredited diagnostic radiology residency program. At the end of that year, the department chair or program director must attest to satisfactory completion of the experience. After that documentation is provided to the ABR, the candidate may re-enter the certification process and will again be required to pass both the qualifying and certifying examinations within a six-year interval.
APPENDIX A

CONTRAST PRE-MEDICATION PROTOCOL

Patients with any of the following require treatment prior to iodinated contrast procedures:
   a. History of a prior anaphylactoid reaction.
   b. Atopic history (multiple drug or food allergies, skin allergies, severe asthma, etc.)
      (slightly greater risk of contrast reaction).
   c. High-level anxiety (slightly increased risk).

Pre-treatment does not eliminate the risk of a second reaction. A second reaction may be the
same, less, or MORE SEVERE than the first reaction.

Patients with prior life threatening reactions should receive another contrast exam only if the
following precautions are taken:
   a. No other exam will answer the clinical question (including ultrasound, MRI, non-contrast
      CT, Barium exam).
   b. Pre-treatment for 13 hours.
   c. An 18g or larger needle IV access, pulse oximeter, and BP monitor during the exam.
   d. Anesthesiology stand-by.

Anaphylactoid reactions that require pre-treatment:
   - Urticaria (hives)
   - Nasal congestion/stuffiness
   - Bronchospasm (wheezing)
   - Facial or eye swelling
   - Diffuse skin erythema
   - Dyspnea (shortness of breath)
   - Rigors (uncontrolled shaking)
   - Severe itching
   - Coughing
   - Severe anxiety
   - Hypotension

Severe life threatening anaphylactoid and non-anaphylactoid reactions:
   - Laryngeal edema
   - Pulmonary edema
   - Arrhythmias
   - Severe hypotension
   - Convulsions
   - Unresponsiveness
   - Shock
   - Cardiopulmonary arrest
CONTRAST PRE-MEDICATION PROTOCOL (CONTINUED)

Protocol drug therapy

Oral (first choice)
- Prednisone 50 mg PO at 13 hours, 7 hours, and 1 hour prior to exam.
- Benadryl (diphenhydramine) 50 mg PO 1 hour prior to exam.

Intravenous (for NPO patients)
- Hydrocortisone 200 mg IV at 13 hours, 7 hours, and 1 hour prior to exam.
- Benadryl 50 mg IV 1 hour prior to exam.

Fast Track (to be used only if necessary):
- Prednisone 50 mg PO (or Hydrocortisone 200 mg IV) at 6 hours and 1 hour prior to exam.
- Benadryl 50 mg PO or IV prior to exam.

NOTE: Outpatients who must drive home or return to work may omit the Benadryl entirely. Otherwise, patients who receive Benadryl must have transportation so that the patient is not required to drive.

Premedication

Premedication is generally reserved for patients with a history of a significant prior contrast reaction. The risk of a repeat reaction in a patient with a history of prior severe reaction is 18.5%, even with non-ionic contrast media. The use of pre-medication to prevent reactions to intravascular non-ionic contrast media is controversial. The most supportive study states pre-medication reduces the incidence of all reactions by approximately 60%, but it is unclear whether the statistical power and methodology of the study allows extrapolation of this risk reduction to patients developing moderate and severe reactions. Corticosteroids are the critical component of any premedication regime, and should be given at least 6 hours before the test. For several reasons, it is preferable for the referring physician to prescribe the premedication regime, although other arrangements may be possible depending on individual circumstances. For simplicity, an oral regime is recommended:

NOTE: For any radiocontrast reactions:
- Document any contrast reaction in medical record.
- Contact the patient’s physician directly.
- Ask for help when needed.
- Explain events to patient carefully.
- Write an incident report if appropriate.
- Involve staff radiologist.

The following are therapeutically equivalent:
- Prednisone 5mg
- Solucortef (Cortisol) 20mg
- Solumedrol (Methylprednisolone) 4mg
APPENDIX B
ADMINISTRATION OF INTRAVENOUS IODINATED CONTRAST MEDIA PRIOR TO CT

Background
Renal impairment is one of the major side effects of intravenous iodinated contrast administration. A wide variety of risk factors have been described, of which pre-existing renal impairment and diabetes mellitus are the most important. The true frequency of contrast nephropathy is difficult to establish because there are no standard diagnostic criteria. In two large series (n = 1114 and 443) of patients undergoing coronary angiography, 6 to 10% of patients had a post-procedural rise in serum creatinine of greater than 0.5 mg/dl. None of these patients became anuric or required hemodialysis. The major factors predictive of contrast nephropathy were elevated baseline serum creatinine and diabetes mellitus. Another study that only included patients with impaired renal function (creatinine greater than 1.35 mg/dl) found the frequency of contrast nephropathy (defined as a rise of at least 25% in serum creatinine) depended on the baseline creatinine level and presence of diabetes mellitus, as shown below:

![Bar chart showing the percentage of patients developing contrast nephropathy based on baseline creatinine levels and diabetes mellitus.](chart.png)

Creatinine testing prior to contrast administration
Routine creatinine testing prior to contrast administration is NOT necessary in all patients. Indications for creatinine testing are listed in Table 1. A creatinine level within the prior 30 days is sufficient in most clinical settings.
Table 1. Indications for creatinine testing prior to contrast administration.

<table>
<thead>
<tr>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes mellitus (insulin-dependent or non-insulin dependent)</td>
</tr>
<tr>
<td>Age &gt; 70</td>
</tr>
<tr>
<td>Congestive cardiac failure</td>
</tr>
<tr>
<td>General debility (e.g., AIDS, advanced malignancy)</td>
</tr>
<tr>
<td>Solitary kidney (e.g., prior nephrectomy, congenital absence)</td>
</tr>
<tr>
<td>Collagen vascular disease</td>
</tr>
<tr>
<td>Paraproteinemia syndromes (e.g., myeloma)</td>
</tr>
<tr>
<td>Renal disease (e.g., renal transplant)</td>
</tr>
<tr>
<td>Family history of kidney failure</td>
</tr>
<tr>
<td>Liver disease (e.g., cirrhosis)</td>
</tr>
<tr>
<td>Currently receiving chemotherapy or other nephrotoxic drugs, including the following:</td>
</tr>
<tr>
<td>• Aminoglycosides</td>
</tr>
<tr>
<td>• Metformin</td>
</tr>
<tr>
<td>• Nonsteroidal anti-inflammatory drugs</td>
</tr>
<tr>
<td>• Amphotericin</td>
</tr>
<tr>
<td>• Chloroethylnitrosourea compounds (carmustine, semustine, streptozocin)</td>
</tr>
<tr>
<td>• Cisplatin</td>
</tr>
<tr>
<td>• Carboplatin</td>
</tr>
<tr>
<td>• Ifosfamide</td>
</tr>
<tr>
<td>• Azacitidine</td>
</tr>
<tr>
<td>• Methotrexate</td>
</tr>
</tbody>
</table>

Contrast administration in patients with an elevated creatinine

The decision to proceed with contrast administration in patients with a creatinine greater than 1.5 mg/dL should ALWAYS be a matter of clinical judgment, based on the individual circumstances of the patient and following consultation between the radiologist and requesting physician. The radiologist is ultimately responsible for determining the most appropriate imaging algorithm. If contrast administration is considered essential, the following options should be considered.

- Discontinue other nephrotoxic drugs.
- Hydration. IV hydration can be achieved with 1/2 normal saline at 75-100 cc/hour for 12 hours before and 12 hours after contrast administration [9].
- Decrease total amount of contrast administered.
- Increase the amount of time between contrast-enhanced studies.
Contrast administration in patients with renal failure

Patients on dialysis can receive IV contrast. The hazards of giving IV contrast to dialysis patients are relatively small but include volume overload and potential damage to residual renal function. These risks should be weighed against the likely diagnostic benefit of contrast enhancement. The nephrology service is readily available for consultation in cases where the risk/benefit assessment is complicated, and closely follows all hospitalized dialysis patients. In particular, the common belief that dialysis patients require early post-procedural dialysis is unsupported by clinical studies and expert guidelines. Dialysis pre-procedure may be desirable, particularly if a large dose of contrast is anticipated or in patients with heart failure. The volumes of both oral and IV contrast should be included in the fluid intake of dialysis patients. Patients with renal insufficiency [who require only intermittent or occasional dialysis] are at substantial risk for contrast media-induced nephrotoxicity with further worsening of their renal function. Alternative imaging studies not requiring contrast media should be considered.

Contrast administration in patients receiving metformin

Metformin (Glucophage) is an oral hypoglycemic agent. Metformin is predominantly eliminated by renal excretion. Contrast-induced nephropathy can result in metformin accumulation and precipitate metformin-related lactic acidosis, a rare but recognized side effect. The current ACR recommendation for contrast administration in patients receiving metformin is that the drug should be discontinued at the time of the procedure and withheld for 48 hours subsequent to the procedure, and reinstituted only after renal function has been re-evaluated and found to be normal (The older recommendation that metformin should be stopped for 48 hours before the exam has been dropped).

Permissible doses

Dose is considered a risk factor for adverse contrast reactions and nephropathy, although the data on this issue are limited. The maximum recommended adult dose of iohexol (Omnipaque; the main intravascular contrast agent used in our department) is of 250 mL of Omnipaque 350 or 291 mL of Omnipaque 300. In practice, dose is only a concern in patients undergoing catheter angiography and CT on the same day (e.g., a patient with metastatic colon cancer who requires a conventional arteriogram to assess arterial anatomy and a CT to define the site and number of lesions). In such circumstances, due regard should be given to the clinical need for an optimal study, rather than rigid adherence to a relatively empiric maximum recommended dose. It may be appropriate to discuss the relative risks and benefits with the patient.

Extravasation:

Contrast media is toxic to tissues and produces an inflammatory response, which may ulcerate and cause skin necrosis in as little as 6 hours. Most responses peak in 1 – 2 days. Acute inflammation may lead to fibrosis, muscle atrophy, and occasionally compartment syndrome. Hyperosmolar contrast and/or extravasation into hands and feet produces a particularly severe reaction.
Treatment for Extravasation:

a. Observe for several hours.
b. Elevate extremity about the level of the heart.
c. Apply hot or cold compresses to increase vasodilation and promote resorption. Cold compresses may decrease cellular uptake of the toxic contrast allowing time for local vascular and lymphatic uptake. Do keep the skin dry – do not use a damp washcloth.
d. Consult plastic surgeon or wound care surgeon if:
   - more than 50 cc hyperosmolar contrast media (30 cc hyperosmolar contrast media in hand or foot) or 100 cc low osmolarity contrast media (60 cc low osmolarity in hand or foot) is extravasated
   - increased swelling and pain after 2 hours
   - decreased capillary refill at any time
   - change in sensation of affected limb
   - skin ulceration or blistering
e. Document reaction in medical record and notify ordering physician.
f. Follow patient’s condition until resolution [by phone, outpatient and/or bedside visits].
g. Inform a staff radiologist.
APPENDIX C
INTEGRIS Baptist Medical Center Radiology Department
Extravasation Report Form
Items 1-3 for Extravasations over 50 ml

Date of extravasation: _______________Approximate time of occurrence: ____________

Patient name: __________________________________________________DOB: _________

Ordering physician notified (if over 50m1) ___________________Time notified:_________

Radiologist notified____________________________________________________________

1. Call radiologist on duty or on call.
2. Call Dr. Adham at 632-4468 office or after hours at 895-2188 or the plastic surgeon covering for him if he is out of town.
3. Call the incident report line at 552-0900 and leave a detailed message of incident.

How to care for extravasation of contrast media above 20 ml and below 49 ml

1. Notify radiologist on-duty or on-call
2. Place an icepack wrapped in a dry cloth over the extravasation for 20-60 minutes
3. Elevate site at or above level of the heart, however do not compromise arterial or venous flow
4. Monitor site for increased swelling or pain
5. Monitor for blisters or ulcerations
6. Monitor for signs of altered tissue perfusion (as evidenced by decreased cap refill, and/or decreased sensation of the site or distal to extravasation)
7. Monitor the patient in the Radiology Department for 30 - 60 minutes. However, the radiologist may determine a more specific time. If 4, 5, or 6 develop notify a radiologist immediately.
8. For a patient who has a 1-19 ml extravasation follow steps 2-7 and notify a radiologist

The patient may be discharged at: ___________________per Dr. ___________________
with written instructions, signs and symptoms to monitor for, and where to call if complications do arise.

The nurse or technologist will call the patient with a 20-49 ml extravasation on a daily basis until all manifestations of extravasation have resolved completely. The patient should be assessed either on the phone or in person (if in house) of the following:

• Is the pain increasing or decreasing?
• Have any blisters or ulcerations developed?
• Are there any coloration changes?
• Does the site feel firm?
• Is the site cold or hot?
• Is there any decrease in sensation distal to the site?

This form is for department monitoring only and does not go into the medical record.
APPENDIX D
UPDATED ACR SCREENING RECOMMENDATIONS ON GADOLINIUM-BASED MR CONTRAST AGENTS, RENAL DISEASE PATIENTS, AND NEPHROGENIC SYSTEMIC FIBROSIS (NSF)

The ACR Contrast Committee and the Subcommittee for MR Safety members now recommends pre-screening patients prior to the administration of Gadolinium-Based MR Contrast Agents.

It is recommended that prior to elective Gadolinium Based MR Contrast Agent administration, a recent (e.g., last 6 weeks) Glomerular Filtration Rate (GFR) assessment be reviewed for patients with a history of:

1. Renal disease (including solitary kidney, renal transplant, renal tumor)
2. Age > 60
3. History of Hypertension
4. History of Diabetes
5. History of severe hepatic disease/liver transplant/pending liver transplant.
TABLE 1
ORGAN SYSTEM ADVERSE EFFECTS

Individual organ systems may manifest isolated adverse side effects from the administration of contrast material.

**Central Nervous System:**
Headache, confusion, dizziness, seizure, loss/diminished consciousness or vision

**Salivary Glands:**
Swelling

**GI Tract:**
Nausea, vomiting, diarrhea, cramping

**Pancreas:**
Swelling

**Skin:**
Pain, swelling, heat, erythema, urticaria

**Kidney:**
Oliguria, hypertension

**Adrenal:**
Hypertension

**Heart:**
Hypotension, arrhythmia, congestive heart failure.

**Respiratory System:**
Bronchospasm, laryngospasm, pulmonary edema
## TABLE 2
CATEGORIES OF REACTIONS

<table>
<thead>
<tr>
<th>MILD TO MODERATE</th>
<th>TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs and symptoms appear self-limited without evidence of progression:</td>
<td>Observe to confirm resolution and/or lack of progression. Usually no</td>
</tr>
<tr>
<td>Nausea; vomiting</td>
<td>treatment necessary. Patient reassurance is usually helpful.</td>
</tr>
<tr>
<td>Warmth (heat)</td>
<td></td>
</tr>
<tr>
<td>Dizziness</td>
<td></td>
</tr>
<tr>
<td>Altered taste</td>
<td></td>
</tr>
<tr>
<td>Pallor</td>
<td></td>
</tr>
<tr>
<td>Chills</td>
<td></td>
</tr>
<tr>
<td>Sweats</td>
<td></td>
</tr>
<tr>
<td>Nasal stuffiness</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SEVERE</strong></td>
<td></td>
</tr>
<tr>
<td>Tachycardia/bradycardia</td>
<td>Treat immediately – see Tables 4 and 5. Consider hospitalization</td>
</tr>
<tr>
<td>Hypertension</td>
<td></td>
</tr>
<tr>
<td>Pronounced cutaneous reaction</td>
<td></td>
</tr>
<tr>
<td>Hypotension</td>
<td></td>
</tr>
<tr>
<td>Dyspnea</td>
<td></td>
</tr>
<tr>
<td>Bronchospasm (wheezing)</td>
<td></td>
</tr>
<tr>
<td>Laryngeal edema</td>
<td></td>
</tr>
</tbody>
</table>
**TABLE 3**  
**PEDIATRIC DOSE SCHEDULES**

<table>
<thead>
<tr>
<th>Medication</th>
<th>Drug</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antihistamine</td>
<td>Diphenhydramine (Benadryl)</td>
<td>1-2 mg/kg IV, up to 50 mg</td>
</tr>
<tr>
<td>Corticosteroids</td>
<td>Methylprednisolone (Solu-Medrol)</td>
<td>2 mg/kg IV loading dose</td>
</tr>
<tr>
<td>Diuretic</td>
<td>Furosemide (Lasix)</td>
<td>1 mg/kg/dose IV max total dose: 40 mg</td>
</tr>
<tr>
<td>Epinephrine</td>
<td>Epinephrine (1:1000)</td>
<td>0.01 ml/kg, repeat in 15-30 minutes max 0.3 ml/dose</td>
</tr>
<tr>
<td>SubQ</td>
<td>Epinephrine (1:10,000)</td>
<td>0.1 ml/kg, repeat every 5-15 minutes, as needed</td>
</tr>
<tr>
<td>IV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inhaler</td>
<td>Albuterol (Proventil, Ventolin)</td>
<td>1-2 puffs every 20 – 30 minutes as needed, (90-180 mcg)</td>
</tr>
<tr>
<td>Vagolytic</td>
<td>Atropine</td>
<td>0.02 ml/kg IV (0.2 mg/kg of the 0.1 mg/ml solution); min dose: 0.1 mg max dose: 0.5 mg (infant/child) 1.0 (adolescent)</td>
</tr>
</tbody>
</table>
## TABLE 4
### MANAGEMENT OF ACUTE REACTIONS

### URTICARIA:
1. Discontinue injection
2. No treatment needed in most cases
3. H1 – receptor blocker:
   - Diphenhydramine (Benadryl) PO/IM/IV 25-50 mg
   - Hydroxyzine (Vistaril) PO/IM/IV 25-50 mg
4. H2-receptor blocker may be added:
   - Cimetidine (Tagamet) 300 mg PO or IV (diluted in 10 ml D5W solution) slowly
   - Ranitidine (Zantac) 50 mg PO or IV (diluted in 10 ml D5W solution) slowly

*If severe/widely disseminated:*
   - Epinephrine SC (1:1,000) 0.1 – 0.3 ml (= 0.1-0.3 mg) (if no cardiac contraindications)

### FACIAL/LARYNDEAL EDEMA:
1. Epinephrine SC (1:1,000) 0.1-0.3ml (=0.1-0.3mg)
   - If hypotension evident, epinephrine (1:10,000) slowly IV 1.0ml, (=0.1mg)
   - Repeat PRN up to maximum of 1.0mg
2. **O₂ 6-10L/min (via mask)**

*If not responsive to therapy or for obvious acute laryngeal edema*
   - Seek appropriate assistance (e.g. CODE team)
   - Consider intubation

### BRONCHOSPASM:
1. **O₂ 6-10L/min (via mask)**
   - Monitor: ECG; O₂ saturation (pulse oximeter); BP
2. Beta agonist – albuterol (Proventil), terbutaline (Brethaire) metaproterenol (Albutent) via metered dose inhale
3. Epinephrine SC (1:1,000) 0.1-0.2ml (=0.1-0.2mg)
4. If hypotension evident, epinephrine (1:10,000) slowly IV 1.0ml, (=0.1mg) [Repeat prn up to maximum of 1.0mg]

*Alternatives*
   a. Terbutaline 0.25-0.5mg IM/SC
   b. Call for assistance (e.g. CODE) for severe bronchospasm (or if O₂ saturation <88% persists)
HYPOTENSION WITH TACHYCARDIA:
1. Elevate legs 60 degrees or more or place in Trendelenberg position
2. Monitor: ECG, pulse oximeter, BP, P, RR
3. $O_2$ 6-10L/min (via mask)
4. Rapid administration of large volumes of isotonic Ringer’s lactate (or normal saline)

*If poorly responsive:*
   - Epinephrine (1:10,000) *slowly* IV 1.0ml, (0.1mg)
   - Repeat PRN up to a maximum of 1.0mg.

HYPERTENSION WITH BRADYCARDIA:
1. Monitor: ECG, pulse oximeter, BP, P, RR
2. Nitroglycerin 0.4 mg tablet, sublingual (may repeat x3); topical 2% ointment, apply one inch strip
3. Sodium nitroprusside; infusion pump necessary to titrate; arterial line may be necessary to monitor
4. Transfer to ICU or emergency department
5. For pheochromocytoma – phentolamine 5.0 mg (1.0mg in children) IV

HYPOTENSION WITH BRADY CARDIA-VAGAL REACTION:
1. Monitor: ECG, pulse oximeter, BP, P, RR
2. IV fluids
3. Atropine 0.5mg IV (up to 3mg total dose)

SEIZURES/CONVULSIONS:
1. $O_2$ 6-10 L/min (via mask)
2. Consider diazepam (Valium) 5.0mg or midazolam (Versed) 2.5mg IV
3. If longer effect needed, obtain consultation; consider phenytoin (Cerebyx) infusion of 15mg/kg (PE= phenytoin equivalent)
4. Monitor: ECG, pulse oximeter, BP, P, RR
5. Consider CODE or intubation if needed

PULMONARY EDEMA:
1. Elevate torso; rotating tourniquets (venous compression)
2. $O_2$ 6-10L/min (via mask)
3. Furosemide (Lasix) 40mg IV, slow push
4. Consider morphine
5. Transfer to ICU or emergency department
6. Corticosteroids optional
TABLE 5
ABCD APPROACH FOR PATIENT EVALUATION AND TREATMENT

A.
- Assessment (severity and category of reaction); blood pressure & pulse (necessary); ECG monitor may be necessary for evaluation of cardiac rhythm
- Assistance (call for it)
- Airway, O₂
- Access (venous) – secure/improve IV line(s) – peripheral or central

B.
- Breathing (begin CPR if necessary); use mouth protective barrier
- Bag – valve mask (e.g., “Ambu” bag) or mouth-mask
- Begin full resuscitation efforts (CPR) if necessary; call CODE
- Beware of paradoxical responses (e.g., beta-blockers may prevent tachycardic response)

C.
- Categorize reaction and patient status
- Circulatory assistance-use crystalloid, e.g., lactated Ringer’s saline or colloid replenishment, infuse rapidly, may use pressure bag or forceful infusion
- Call CODE if necessary; CPR; continue to monitor

Common denominators-assess cardiac output; capillary leak (third spacing); decreased venous return, decreased peripheral vascular resistance

D.
- Drug therapies (see Tables 4 and 5)
- Do monitor, assess and reassure the patient; use correct dose (concentration) and route for drugs; push IV fluids and O₂
- Do not delay (do call for help);
- Do not use incorrect dose(s) and drugs
ADVICE TO MAXIMIZE YOUR RESIDENCY EXPERIENCE

1. Every resident needs to study consistently from day one. It is suggested that each resident study two hours per day. Concentrate on studying in the area to which you are assigned that month, but study other areas as well. It is especially helpful to read on diseases or techniques you saw that day or to prepare for cases scheduled for the next day. Once a resident gets behind in his or her studies, it can be very difficult to catch up. Do yourselves a favor and study consistently—this is a habit you will need for the rest of your career.

2. This residency works best when teamwork is stressed. If your assigned duties are caught up, pick up studies in other areas or modalities. Be quick to help out your fellow resident. Be professional and courteous to other members of the radiology team including transcriptionists, technologists, nurses, and others.

3. Be on time with no unexcused absences.

4. Attend and participate in conferences.

5. Do make balance a priority. Everyone needs sufficient rest, relaxation, and fun. Keep your physical health, mental health, spiritual health, and relational health in top shape. Be especially careful not to moonlight so much that your studies or your well-being is compromised. You are expected to work hard and study hard, but keep yourself in good physical and emotional condition. Consult the INTEGRIS Graduate Medical Education Handbook for information regarding services available to you, and or talk to your program director or another staff member.
DICTATION PRINCIPLES AND TEMPLATES

The radiology report is often the primary means of communication between the radiologist and the referring physician and is a formal medicolegal document. Fair or unfair, judgments of clinical colleagues about radiology are increasingly made through our reports rather than through personal interactions.

Guidelines for dictations:

- Use **structured dictation** format on all non-radiographic imaging studies (see templates below).
- Use complete sentences in the findings section and arrange the findings in the same order every time to avoid omissions.
- Present tense is preferred in reporting and is appropriate despite the fact that every examination or procedure is performed before the dictation.
- Avoid "There is" and "There are" in the dictation.
- Avoid the word “significant” in your dictations.
- Avoid the phrase "cannot be excluded." This usage is a grammatically undesirable double negative and is used inappropriately.
- Avoid using the word “appears.” It conveys more confidence to the clinician to say “is.”
- Avoid using the word “prominent.” This is a “classic hedge” and is overused.
- Avoid the term “bony.” Osseous is the preferred term.
- Consolidation or airspace opacity should be used instead of “infiltrate.”
- Always use the same unit of measurement throughout the report (preferably use centimeters rather than millimeters).
- When describing a mass or fluid collection, attempt to give measurements in all 3 dimensions (AP x ML x CC).
- For lesions that are not discretely measurable, define abnormalities as mild, moderate, severe or small, moderate, large.
- Avoid the terms "if clinically indicated" or "correlate clinically."
- Impression should always address the clinical question. For example, if the requisition states "evaluate for acute appendicitis", then the impression should state whether acute appendicitis is or is not present.
- Items in the impression should be numbered in order of importance.
- Avoid repeating measurements and long descriptions in the impression.
- Differential diagnosis and recommendations should only be in the impression (not the findings).
- Indications should be included for every exam! Best to place in your templates.
- Comparisons should also be included for every exam. Best to place in your templates.
DICTATION PRINCIPLES AND TEMPLATES (CONTINUED)

PROTOCOL FOR SIGNIFICANT DISPARITY BETWEEN PRELIMINARY REPORTS AND FINAL REPORTS WHEN CHECKING OUT WITH STAFF:

This is a radiology residency, a learning environment. Our goal is to train you to be excellent diagnostic radiologists. But, in the course of your residency you WILL have significant misses occasionally occur. When this occurs (staff will tell you when this has happened during check out), you must add an ADDENDUM or COMMENT at the bottom of your report that states:

"After reviewing this study with attending radiologist, the following findings (changes from original report) were noted. ____________________________________________________________
This disparity and new findings were discussed with Dr. ________________by Dr. _______________ at _______________hours."
RADIOGRAPHY

CHEST RADIOGRAPH

COMPARISON:

INDICATIONS:

FINDINGS:

Heart and pulmonary vascularity are normal. Lungs are clear. Osseous structures are normal.

IMPRESSION:

Normal chest.

ABDOMEN RADIOGRAPH

COMPARISON:

INDICATIONS:

FINDINGS:

No pneumoperitoneum is present. Small bowel and large bowel are normal. No organomegaly or abnormal calcifications are present. Osseous structures are normal.

IMPRESSION:

Normal abdomen.

ACUTE ABDOMEN SERIES RADIOGRAPH

COMPARISON:

INDICATIONS:

FINDINGS:

Heart and pulmonary vascularity are normal. Lungs are clear. Osseous structures are normal.

No pneumoperitoneum is present. Small bowel and large bowel are normal. No organomegaly or abnormal calcifications are present. Osseous structures are normal.

IMPRESSION:

No acute process in the abdomen.
EXTREMITY RADIOGRAPH

COMPARISON:

INDICATIONS:

FINDINGS:

Bones and joint spaces are normal.

IMPRESSION:

Normal <extremity>.

CERVICAL SPINE RADIOGRAPH

COMPARISON:

INDICATIONS:

FINDINGS:

Bones, disc spaces, and joint spaces are normal. Soft tissues are normal. Alignment is normal.

Craniocervical junction is normal.

IMPRESSION:

Normal cervical spine.

THORACIC SPINE RADIOGRAPH

COMPARISON:

INDICATIONS:

FINDINGS:

Bones and disc spaces are normal. Alignment is normal.

IMPRESSION:

Normal thoracic spine.
LUMBAR SPINE RADIOGRAPH

COMPARISON:

INDICATIONS:

FINDINGS:

Bones, disc spaces, and joint spaces are normal. Alignment is normal.

IMPRESSION:

Normal lumbar spine.

PELVIS RADIOGRAPH

COMPARISON:

INDICATIONS:

FINDINGS:

Bones and joint spaces are normal.

IMPRESSION:

Normal pelvis.
GASTROINTESTINAL RADIOLOGY

DYSPHAGIAGRAPH

TECHNIQUE: Routine dysphagiagram performed with multiple consistencies. Speech pathology present during the procedure.

COMPARISON:

INDICATIONS:

FINDINGS:

Thick liquid: No vestibular penetration or aspiration is present.

Thin liquid: No vestibular penetration or aspiration is present.

Puree: No vestibular penetration or aspiration is present.

Solid: No vestibular penetration or aspiration is present.

IMPRESSION:

Normal dysphagiagram.

ESOPHAGRAM

TECHNIQUE: Routine esophagram performed after oral administration of barium.

COMPARISON:

INDICATIONS:

FINDINGS:

Esophageal structure and function are normal. The 12.5 mm barium pill passes normally through the esophagus into the stomach.

IMPRESSION:

Normal esophagus.
UPPER GI

TECHNIQUE: Routine upper gastrointestinal examination performed after oral administration of barium.

COMPARISON:

INDICATIONS:

FINDINGS:

Esophageal structure and function are normal. The 12.5 mm barium pill passes normally through the esophagus into the stomach.

Stomach and duodenum are normal without stricture, ulceration, or mass.

IMPRESSION:

Normal esophagus, stomach, and duodenum.

UPPER GI AND SMALL BOWEL FOLLOW THROUGH

TECHNIQUE: Routine upper gastrointestinal examination and small bowel follow through performed after oral administration of barium.

COMPARISON:

INDICATIONS:

FINDINGS:

Esophageal structure and function are normal. The 12.5 mm barium pill passes normally through the esophagus into the stomach.

Stomach and duodenum are normal without stricture, ulceration, or mass.

Jejunum and ileum are normal without stricture or mass.

IMPRESSION:

Normal esophagus, stomach, and small intestine.
**BARIUM ENEMA**

TECHNIQUE: Routine barium enema performed after rectal administration of barium.

COMPARISON:

INDICATIONS:

FINDINGS:

Large intestine is normal without diverticula, mass, or stricture. Contrast refluxes into a normal appearing terminal ileum.

IMPRESSION:

Normal large intestine.
GENITOURINARY RADIOLOGY

INTRAVENOUS UROGRAM

TECHNIQUE: Routine intravenous urogram performed.

COMPARISON:

INDICATIONS:

FINDINGS:
Renal parenchyma enhances promptly and symmetrically. Both kidneys are normal in size, shape, and position.
Ureters are normal.
Urinary bladder is normal.

IMPRESSION:
Normal intravenous urogram.

VOIDING CYSTOURETHROGRAM

TECHNIQUE: Routine cystourethrogram performed after urinary bladder catheterization. Urinary bladder was filled with contrast to a capacity of [] ml.

COMPARISON:

INDICATIONS:

FINDINGS:
Urinary bladder is normal.
No vesicoureteral reflux is demonstrated with filling or voiding.
Urethra is normal.

IMPRESSION:
Normal voiding cystourethrogram.
**RETROGRADE URETHROGRAM**

TECHNIQUE: Contrast was injected into the urethra with fluoroscope.

COMPARISON:

INDICATIONS:

FINDINGS:

Urethra is normal.

Contrast material is seen within a normal urinary bladder.

IMPRESSION:

Normal retrograde urethrogram.

---

**RETROGRADE PYELOGRAM**

TECHNIQUE: Contrast material was injected retrograde into the ureters.

COMPARISON:

INDICATIONS:

FINDINGS:

Ureters, pelves, and calyces are normal bilaterally.

Urinary bladder: Normal.

IMPRESSION:

Normal retrograde pyelogram.
HYSTEROSALPINGOGRAM

TECHNIQUE: Routine hysterosalpingogram performed after cannulation of the cervix.

COMPARISON:

INDICATIONS:

FINDINGS:
Uterus is normal.
Both fallopian tubes are patent with bilateral peritoneal spill.

IMPRESSION:
Normal hysterosalpingogram.
BODY CT

CT CHEST

TECHNIQUE: Multiple axial images of the chest following intravenous contrast. Reformatted coronal and sagittal images. Images viewed on lung and soft tissue windows.

COMPARISON:

INDICATIONS:

FINDINGS:
Lungs are clear without effusions.
Heart, great vessels, esophagus, and trachea are normal.
No pathologically enlarged lymph nodes are present.
Musculoskeletal structures are normal.
Upper abdomen is normal.

IMPRESSION:
Normal chest.
CT PULMONARY EMBOLISM PROTOCOL

TECHNIQUE: Multiple axial images of the pulmonary arteries following intravenous contrast. Reformatted coronal and sagittal images.

COMPARISON:

INDICATIONS:

FINDINGS:

Lungs are clear without effusions.

No filling defects are in the pulmonary arteries or segmental branches. Heart, great vessels, esophagus, and trachea are normal.

No pathologically enlarged lymph nodes are present.

Musculoskeletal structures are normal.

Upper abdomen is normal.

IMPRESSION:

No pulmonary embolism.
HIGH RESOLUTION CT CHEST

TECHNIQUE: Multiple high resolution noncontiguous axial images of the chest obtained without contrast. (*If prone and supine images or inspiration/expiration phase performed, add to protocol).

COMPARISON:

INDICATIONS:

FINDINGS:

No bronchiectasis, interstitial thickening, or honeycombing is demonstrated. Lungs are clear without effusions.

Heart, great vessels, esophagus, and trachea are normal.

No pathologically enlarged lymph nodes are present.

Musculoskeletal structures are normal.

Upper abdomen is normal.

IMPRESSION:

No evidence of interstitial lung disease.
CT ABDOMEN/PELVIS

TECHNIQUE: Multiple axial images of the abdomen and pelvis following intravenous and oral contrast. Reformatted coronal and sagittal images.
Contrast: _____ CC _____IV
If delayed images performed – add to technique: _____ CC oral _____

COMPARISON:

INDICATIONS:

ABDOMINAL FINDINGS:

Lung bases are normal.
Spleen, pancreas, liver, gallbladder, kidneys, and adrenal glands are normal.
Stomach, small intestine, and large intestine are normal. Appendix is normal.
No pathologically enlarged lymph nodes are present.
Vascular structures are normal.
Musculoskeletal structures are normal.

PELVIC FINDINGS:

Urinary bladder is normal.
Uterus and adnexa (or Prostate gland) are normal.

IMPRESSION:

Normal abdomen and pelvis.
CT RENAL STONE PROTOCOL

TECHNIQUE: Multiple axial images of the abdomen and pelvis without intravenous contrast. Reformatted coronal and sagittal images.

COMPARISON:

INDICATIONS:

ABDOMINAL FINDINGS:

Lung bases are normal.

No renal or ureteral calculi are demonstrated. Spleen, pancreas, liver, gallbladder, kidneys, and adrenal glands are normal.

Stomach, small intestine, and large intestine are normal. Appendix is normal.

No pathologically enlarged lymph nodes are present.

Vascular structures are normal.

Musculoskeletal structures are normal.

PELVIC FINDINGS:

Urinary bladder is normal.

Uterus and adnexa (or Prostate gland) are normal.

IMPRESSION:

No urolithiasis.
CT PELVIS

TECHNIQUE: Multiple axial images of the pelvis following intravenous contrast. Reformatted coronal and sagittal images.

COMPARISON:

INDICATIONS:

FINDINGS:

Urinary bladder is normal.

Uterus and adnexa (or Prostate gland) are normal.

Rectosigmoid colon is normal.

No pathologically enlarged lymph nodes are present.

Vascular structures are normal.

Musculoskeletal structures are normal.

IMPRESSION:

Normal pelvis.
BODY MRI

MR ABDOMEN

TECHNIQUE: List sequences.
Contrast: _____ ml (multihance)

COMPARISON:

INDICATIONS:

FINDINGS:
Spleen, pancreas, liver, gallbladder, adrenal glands, and kidneys are normal.
Stomach, small intestine, and large intestine are normal.
No pathologically enlarged lymph nodes are present.
Vascular structures are normal.
Musculoskeletal structures are normal.

IMPRESSION:
Normal abdomen.

MRCP

TECHNIQUE: List sequences.

COMPARISON:

INDICATIONS:

FINDINGS:
Biliary and pancreatic ducts are normal. Common bile duct measures [ ] cm. Spleen, pancreas, liver, gallbladder, adrenal glands, and kidneys are normal.
Stomach, small intestine, and large intestine are normal.
No pathologically enlarged lymph nodes are present.
Vascular structures are normal.
Musculoskeletal structures are normal.

IMPRESSION:
Normal biliary and pancreatic ducts.
MR SOFT TISSUE PELVIS

TECHNIQUE: Contrast: _____ ml _____

COMPARISON:

INDICATIONS:

FINDINGS:

Urinary bladder is normal.

Uterus and adnexa are normal.

No pathologically enlarged lymph nodes are present.

Vascular structures are normal.

Musculoskeletal structures are normal.

IMPRESSION:

Normal pelvis.

MR PROSTATE

TECHNIQUE: Multiplanar, multisequence imaging of the prostate gland pre and post intravenous gadolinium. Perfusion imaging also performed. Contrast: _____ ml _____.

COMPARISON:

INDICATIONS:

FINDINGS:

Prostate gland measures [ ] x [ ] x [ ] cm. Peripheral zone and central gland are normal. Flow dynamics are normal.

No invasion of the neurovascular bundles or seminal vesicles is demonstrated.

Urinary bladder is normal.

No pathologically enlarged lymph nodes are present.

Musculoskeletal structures are normal.

IMPRESSION:

No evidence of extracapsular invasion of prostate carcinoma.
ULTRASOUND

ULTRASOUND ABDOMEN

TECHNIQUE: Multiple sonographic images of the abdomen.

COMPARISON:

INDICATIONS:

FINDINGS:

Liver is normal in size and echogenicity. Gallbladder is normal with wall thickness [ ] cm. Common duct measures [ ] cm.

Pancreas is normal.

Spleen is normal measuring [ ] cm.

Kidneys are normal.

Aorta and inferior vena cava are normal.

IMPRESSION:

Normal ultrasound of the abdomen.

ULTRASOUND PELVIS

TECHNIQUE: Multiple sonographic images of the pelvis.

COMPARISON:

INDICATIONS:

FINDINGS:

Uterus is normal measuring [ ] x [ ] x [ ] cm. Endometrial thickness is [ ] cm.

Right ovary is normal measuring [ ] x [ ] x [ ] cm.

Left ovary is normal measuring [ ] x [ ] x [ ] cm.

No free fluid is present.

IMPRESSION:

Normal ultrasound of pelvis.
ULTRASOUND PYLORUS

TECHNIQUE: Multiple sonographic images of the pylorus.

COMPARISON:

INDICATIONS:

FINDINGS:

Pylorus is normal in size and appearance.

Length is [ ] cm.

Diameter is [ ] cm.

Muscle thickness is [ ] cm.

IMPRESSION:

Normal ultrasound of pylorus.

THYROID ULTRASOUND

TECHNIQUE: Multiple sonographic images of the thyroid gland.

COMPARISON:

INDICATIONS:

FINDINGS:

Right lobe is normal measuring [ ] x [ ] x [ ] cm.

Left lobe is normal measuring [ ] x [ ] x [ ] cm.

Isthmus is normal measuring [ ] cm anteroposterior.

IMPRESSION:

Normal ultrasound of thyroid gland.
RENAL ULTRASOUND

TECHNIQUE: Multiple sonographic images of the kidneys and urinary bladder.

COMPARISON:

INDICATIONS:

FINDINGS:
Right kidney is normal in echogenicity and measures [ ] cm in length. No hydronephrosis.
Left kidney is normal in echogenicity and measures [ ] cm in length. No hydronephrosis.
Urinary bladder is normal.

IMPRESSION:
Normal renal ultrasound.

SCROTAL ULTRASOUND

TECHNIQUE: Multiple sonographic images of the scrotum.

COMPARISON:

INDICATIONS:

FINDINGS:
Right testicle is normal measuring [ ] x [ ] x [ ] cm. Doppler flow is normal. No hydrocele or varicocele is present. Epididymis is normal.
Left testicle is normal measuring [ ] x [ ] x [ ] cm. Doppler flow is normal. No hydrocele or varicocele is present. Epididymis is normal.

IMPRESSION:
Normal ultrasound of the scrotum.
NEONATAL HEAD ULTRASOUND

TECHNIQUE: Multiple sonographic images of the brain.

COMPARISON:

INDICATIONS:

FINDINGS:

Ventricles and ventricular ratios are normal.

Brain parenchyma echogenicity is normal. No hemorrhage is present.

IMPRESSION:

Normal ultrasound of the neonatal brain.
COMPLETE OBSTETRIC ULTRASOUND

TECHNIQUE: Multiple sonographic images of the pelvis.

COMPARISON:

INDICATIONS:

FINDINGS:

Single living intrauterine gestation is present with heart rate of [] beats per minute. The fetus is in the [] position.

Amniotic index is [] cm, which is normal.

Placenta is [] and estimated at grade []. Cervical length is [] cm.

Kidneys, urinary bladder, extremities, aorta, stomach, ventricles, thalamus, spine, 3 vessel cord, and 4 chamber heart are normal.

Measurements:
Biparietal diameter: [] ( [] weeks [] days)
Head circumference: [] ( [] weeks [] days)
Abdominal circumference: [] ( [] weeks [] days)
Femur length: [] ( [] weeks [] days)
Head/abdominal circumference ratio: [] (normal [])


Estimated gestational age: [] weeks and [] days.

IMPRESSION:

Single living intrauterine gestation with estimated gestational age of [] weeks and [] days. Estimated date of delivery is []. 
LIMITED OBSTETRIC ULTRASOUND

TECHNIQUE: Multiple sonographic images of the pelvis.

COMPARISON:

INDICATIONS:

FINDINGS:

Gestation: Single living intrauterine gestation is present with heart rate of [] beats per minute. The fetus is in the [] position.

Amniotic fluid: Amniotic index is [] cm, which is normal.

Placenta and cervix: Placenta is [] and estimated at grade []. Cervical length is [] cm.

Measurements:
Biparietal diameter: [] ([] weeks [] days)
Head circumference: [] ([] weeks [] days)
Abdominal circumference: [] ([] weeks [] days)
Femur length: [] ([] weeks [] days)
Head/abdominal circumference ratio: [] (normal [])

Estimated fetal weight: [] +/- [] grams. [] lbs. +/- [] oz.

Estimated gestational age: [] weeks and [] days.

IMPRESSION:

Single living intrauterine gestation with estimated gestational age of [] weeks and [] days. Estimated date of delivery is [].

RENAL TRANSPLANT ULTRASOUND

TECHNIQUE: Multiple sonographic images of the renal transplant.

COMPARISON:

INDICATIONS:

FINDINGS:

No hydronephrosis or perinephric fluid collection is present.

Renal artery and vein anastamoses are patent. Resistive indices of the intrarenal arteries range from [] to [].

IMPRESSION:

Normal renal transplant.
LOWER EXTREMITY ARTERIAL DOPPLER

TECHNIQUE: Multiple Ultrasound images of the arteries of the lower extremities, with spectral Doppler analysis.

COMPARISON:

INDICATIONS:

FINDINGS:

Right common femoral, superficial femoral, popliteal, anterior tibial, peroneal, and posterior tibial arteries demonstrate normal triphasic arterial flow.

Left common femoral, superficial femoral, popliteal, anterior tibial, peroneal, and posterior tibial arteries demonstrate normal triphasic arterial flow.

IMPRESSION:

Normal lower extremity arteries.

TIPS DOPPLER

TECHNIQUE: Multiple Doppler images of the TIPS stent, with spectral Doppler analysis.

COMPARISON:

INDICATIONS:

FINDINGS:

Portal veins:
Right portal vein demonstrates expected hepatofugal flow.
Left portal vein demonstrates expected hepatofugal flow.
Main portal vein demonstrates normal hepatopetal flow.

TIPS:
Main portal vein: [] m/s.
Portal TIPS: [] m/s.
Mid TIPS: [] m/s.
Hepatic TIPS: [] m/s.

IMPRESSION:

Normal TIPS stent.
RENAL ARTERY DOPPLER

TECHNIQUE: Multiple Doppler images and spectral Doppler analysis of the renal arteries.

COMPARISON:

INDICATIONS:

FINDINGS:

Right renal aortic ratio is[]. Renal acceleration times range[ - ]msec. End diastolic ratio is[].
Left renal aortic ratio is[]. Renal acceleration times range[ - ]msec. End diastolic ratio is[].

IMPRESSION:
No renal artery stenoses.

LOWER EXTREMITY VENOUS DOPPLER

TECHNIQUE: Multiple Ultrasound images of the veins of the lower extremities with spectral Doppler analysis.

COMPARISON:

INDICATIONS:

FINDINGS:

Right common femoral, superficial femoral, popliteal, anterior tibial, peroneal, and posterior tibial veins demonstrate normal flow, augmentation, and compression.

Left common femoral, superficial femoral, popliteal, anterior tibial, peroneal, and posterior tibial veins demonstrate normal flow, augmentation, and compression.

IMPRESSION:
No deep venous thromboses bilateral lower extremities.
UPPER EXTREMITY VENOUS DOPPLER

TECHNIQUE: Multiple Ultrasound images of the veins of the upper extremities with spectral Doppler analysis.

COMPARISON:

INDICATIONS:

FINDINGS:

Right internal jugular, subclavian, axillary, brachial, median, radial, ulnar, cephalic, and basilic veins demonstrate normal flow.

Left internal jugular, subclavian, axillary, brachial, median, radial, ulnar, cephalic, and basilic veins demonstrate normal flow.

IMPRESSION:

No venous thromboses bilateral upper extremities.

HEPATIC VASCULAR ULTRASOUND

TECHNIQUE: Multiple Ultrasound images of the hepatic vasculature with spectral Doppler analysis.

COMPARISON:

INDICATIONS:

FINDINGS:

Portal veins demonstrate normal hepatopetal flow without thrombus.

Splenic vein demonstrates normal hepatopetal flow without thrombus. Superior mesenteric vein is obscured by bowel gas.

Hepatic veins demonstrate normal hepatofugal flow without thrombus. Inferior vena cava is patent.

Hepatic arteries demonstrate normal flow.

IMPRESSION:

Normal hepatic vessels.
ABDOMINAL AORTA ULTRASOUND

TECHNIQUE: Multiple sonographic images of the aorta and common iliac arteries with spectral Doppler analysis.

COMPARISON:

INDICATIONS:

FINDINGS:

Aorta measures [ ] cm in diameter. No significant atherosclerosis.

Right common iliac artery measures [ ] cm and left common iliac artery measures [ ] cm.

IMPRESSION:

No abdominal aortic aneurysm.

MESENTERIC DOPPLER

TECHNIQUE: Multiple Ultrasound images of the mesenteric arteries with spectral Doppler analysis.

COMPARISON:

INDICATIONS:

FINDINGS:

Abdominal aorta velocity is [ ] m/s.

Celiac artery velocity is [ ] m/s.

Superior mesenteric artery velocity is [ ] m/s.

Inferior mesenteric artery velocity is [ ] m/s.

IMPRESSION:

No mesenteric artery stenoses.
FETAL BIOPHYSICAL PROFILE

TECHNIQUE: Routine biophysical profile.

COMPARISON:

INDICATIONS:

FINDINGS:

Umbilical artery systolic/diastolic ratio is [].

Heart rate is [] beats per minute.

Amniotic index is [] cm, which is normal.

Cervix measures [] cm.

Biophysical profile:
Fetal breathing movements: []
Gross body movements: []
Fetal tone: []
Qualitative amniotic fluid volume: []

IMPRESSION:

Normal biophysical profile.
CAROTID ULTRASOUND

TECHNIQUE: Multiple Doppler images of the carotid and vertebral arteries using greyscale imaging and spectral Doppler analysis.

COMPARISON:

INDICATIONS:

FINDINGS:

Right carotid artery normal with no significant atherosclerosis.  
CCA peak systolic velocity is [] m/s.  
ICA peak systolic velocity is [] m/s.  
ICA/CCA ratio is [].  
ECA is patent.

Left carotid artery: Normal with no significant atherosclerosis.  
CCA peak systolic velocity is [] m/s.  
ICA peak systolic velocity is [] m/s.  
ICA/CCA ratio is [].  
ECA is patent.

Vertebral arteries demonstrate normal antegrade flow.

IMPRESSION:

No hemodynamically significant stenoses of the carotid arteries.
NUCLEAR MEDICINE

WHOLE BODY PET/CT

TECHNIQUE: The patient’s blood glucose was [] mg/dl immediately prior to injection. A total of [] mCi F-18 FDG was administered intravenously. One hour post injection, whole body PET images were obtained from skull base to upper thighs. Additionally, noncontrast CT was done for attenuation correction and to assist in localizing the PET findings.

COMPARISON:

INDICATIONS:

FINDINGS:

Head/Neck:
The brain demonstrates normal FDG metabolism. However, early intracranial metastases are best detected by MRI brain with gadolinium. Physiologic uptake is seen within the oropharyngeal soft tissues and salivary glands.

Thorax:
Physiologic uptake is seen in the myocardium. No FDG avid lymph nodes or pulmonary lesions are demonstrated.

Abdomen/Pelvis:
Physiologic activity is seen in the liver, spleen, urinary system, and bowel without FDG avid malignancy.

Musculoskeletal:
No FDG avid malignancy is demonstrated.

IMPRESSION:

No evidence of malignancy.
THREE PHASE BONE SCINTIGRAPHY

TECHNIQUE: Three phase bone scintigraphy limited to the [] was obtained following the IV administration of [] mCi of Tc99m-MDP.

COMPARISON:

INDICATIONS:

FINDINGS:

During the angiographic phase, no hyperfusion is present.
During the blood pool phase, no hyperemia is present.
During the delayed phase, no abnormal activity is present.

IMPRESSION:

Normal [].

WHOLE BODY BONE SCINTIGRAPHY

TECHNIQUE: Anterior and posterior whole body images were obtained following IV administration of [] mCi of Tc99m-MDP.

COMPARISON:

INDICATIONS:

FINDINGS:

Bones demonstrate normal activity.
Soft tissues demonstrate normal activity.

IMPRESSION:

Normal whole bone scintigraphy.
VENTILATION PERFUSION SCINTIGRAPHY

TECHNIQUE: Routine ventilation perfusion scintigraphy after inhalation of [] mCi Xenon-133 gas and IV administration of [] mCi of Tc-99m-MAA.

COMPARISON: Chest [].

INDICATIONS:

FINDINGS:

No ventilation defects are present. No air trapping is present.

No perfusion defects are present.

IMPRESSION:

Normal ventilation and perfusion of the lungs.

QUANTITATIVE LUNG SCINTIGRAPHY

TECHNIQUE: Routine ventilation images were obtained after inhalation of [] mCi Xenon-133 gas. Perfusion images of both lungs were obtained following the IV administration of [] mCi Tc-99m MAA. Quantitative analysis was performed.

COMPARISON:

INDICATIONS:

FINDINGS:

Ventilation is []% right lung and []% left lung.

Perfusion is []% right lung and []% left lung.

Pulmonary shunt is []%.

IMPRESSION:

Normal ventilation and perfusion of the lungs.
HEPATOBILEARY SCINTIGRAPHY

TECHNIQUE: Routine hepatobiliary scintigraphy following IV administration of [] mCi of Tc-99m-mebrofenin. In addition, IV administration of [] microcuries of cholecystokinin.

COMPARISON:

INDICATIONS:

FINDINGS:

Liver activity is normal. Gallbladder activity is seen at [] minutes. Small bowel activity is seen at [] minutes.

Gallbladder ejection fraction is [%] (normal > 35%). CCK did not reproduce symptoms.

IMPRESSION:

Normal hepatobiliary scintigraphy with gallbladder ejection fraction of [%].

RENAL SCINTIGRAPHY

TECHNIQUE: Dynamic images of the kidneys were obtained following the IV administration of [] mCi Tc-99m MAG3.

COMPARISON:

INDICATIONS:

FINDINGS:

Right kidney demonstrates normal perfusion, uptake, and excretion.

Left kidney demonstrates normal perfusion, uptake, and excretion.

IMPRESSION:

Normal kidneys.
THYROID SCINTIGRAPHY

TECHNIQUE: Images of the thyroid were obtained 24 hours following the oral administration of [] microcuries of I-123.

COMPARISON:

INDICATIONS:

FINDINGS:
Right lobe demonstrates normal activity.
Left lobe demonstrates normal activity.
24 hour uptake is []%.

IMPRESSION:
Normal thyroid gland.

GASTRIC EMPTYING SCINTIGRAPHY

TECHNIQUE: Static images of the anterior and posterior abdomen were obtained immediately and at 30, 60, 90, and 120 minutes following the oral ingestion of food radiolabeled with [] mCi of Tc-99m sulfur colloid.

COMPARISON:

INDICATIONS:

FINDINGS:
At 30 minutes, gastric emptying is []%.
At 60 minutes, gastric emptying is []%.
At 90 minutes, gastric emptying is []%.
At 120 minutes, gastric emptying is []%.

IMPRESSION:
Normal gastric emptying.
GASTROINTESTINAL BLEEDING SCINTIGRAPHY

TECHNIQUE: Dynamic images of the anterior and posterior abdomen and pelvis were obtained for [ ] minutes following the labeling of the patient's red blood cells with [ ] mCi of Tc99m-pertechnetate.

COMPARISON:

INDICATIONS:

FINDINGS:
No abnormal activity is demonstrated in the abdomen or pelvis.

IMPRESSION:
No active gastrointestinal bleeding.

OCTREOSCAN

TECHNIQUE: Anterior and posterior whole-body images were performed 4 and 24 hours following the IV administration of [ ] mCi In-111 octreotide. SPECT/CT images of the abdomen and pelvis with reconstructions in the axial, coronal, and sagittal planes were obtained at 24 hours.

COMPARISON:

INDICATIONS:

FINDINGS:
No abnormal activity is demonstrated.
Physiologic activity is demonstrated within the thyroid, liver, spleen, gastrointestinal tract, and urinary tract.

IMPRESSION:
No evidence of neuroendocrine tumor.
PARATHYROID SCINTIGRAPHY

TECHNIQUE: Static images of the anterior neck and chest were obtained immediately following the IV administration [] mCi Tc-99m sestamibi. Delayed images of the neck and anterior chest were obtained at 2 hours.

COMPARISON:

INDICATIONS:

FINDINGS:

On the immediate images, no abnormal uptake is demonstrated. Physiologic uptake is present.

On the 2 hour delayed images, no parathyroid adenoma is demonstrated.

IMPRESSION:

No evidence of parathyroid adenoma.

RENAL TRANSPLANT SCINTIGRAPHY

TECHNIQUE: Dynamic images of the transplant were obtained anteriorly for [] minutes following the IV administration of [] mCi Tc-99m MAG3. Lasix was administered IV at [] minutes.

COMPARISON:

INDICATIONS:

FINDINGS:

Renal transplant demonstrates normal perfusion, uptake, and excretion.

No urinary leak is present.

IMPRESSION:

Normal renal transplant.
NUCLEAR VENTRICULOGRAM

TECHNIQUE: Red blood cells were labeled with [ ] mCi of Tc-99m pertechnetate. The red blood cells were then re-injected and gated images in the LAO projection were obtained of the heart at rest. Gated equilibrium data was used to calculate the left ventricular ejection fraction.

COMPARISON:

INDICATIONS:

FINDINGS:

Cardiac wall motion is normal.

Left ventricular ejection fraction is [ ]%.

IMPRESSION:

Normal left ventricular ejection fraction [ ]%.
**MUSCULOSKELETAL**

**MR SHOULDER**

TECHNIQUE: Multiplanar, multisequence imaging of the shoulder without gadolinium.

COMPARISON:

INDICATIONS:

FINDINGS:

Rotator cuff: No partial thickness or full thickness tear is present. No muscular atrophy is present.

Acromioclavicular region: Acromioclavicular joint is normal. Acromion is type 2.

Glenoid labrum and bicipital tendon: Labrum is normal. Normal long head biceps tendon is located within the bicipital groove.

Bone marrow and joint space: No effusion or bone marrow edema is present.

Soft tissues: Normal.

IMPRESSION:

Normal shoulder.

**MR ELBOW**

TECHNIQUE: Multiplanar, multisequence imaging of the elbow without gadolinium.

COMPARISON:

INDICATIONS:

FINDINGS:

Ligaments: Collateral ligaments are normal.

Tendons: Origins of the common extensor and flexor tendons are normal. Insertions of the triceps, biceps, and brachialis tendons are normal.

Bone marrow and joint space: No effusion or bone marrow edema is present.

Cubital tunnel: Normal.

Soft tissues: Normal.

IMPRESSION:

Normal elbow.
MR WRIST

TECHNIQUE: Multiplanar, multisequence imaging of the wrist without gadolinium.

COMPARISON:

INDICATIONS:

FINDINGS:

Ligaments: Scapholunate and lunotriquetral ligaments are normal.

Triangular fibrocartilage complex: Normal.

Tendons: Extensor and flexor tendons are normal.

Bone marrow and joint space: No effusion or bone marrow edema is present.

Carpal tunnel and Guyon’s canal: Normal.

Soft tissues: Normal.

IMPRESSION:

Normal wrist.

MR PELVIS

TECHNIQUE: Multiplanar, multisequence imaging of the pelvis without gadolinium.

COMPARISON:

INDICATIONS:

FINDINGS:

Bone marrow and joint space: No effusion of bone marrow edema is present.

Bursa: No bursal fluid collections are present.

Muscles: No muscular edema or atrophy is present.

Soft tissues: Normal.

Pelvic organs: Normal.

IMPRESSION:

Normal pelvis.
**MR KNEE**

TECHNIQUE: Multiplanar, multisequence imaging of the knee without gadolinium.

COMPARISON:

INDICATIONS:

FINDINGS:

Menisci: Medial and lateral menisci are normal.

Ligaments: Cruciate and collateral ligaments are normal.

Bone marrow and chondral surfaces: No bone marrow edema is present. Articular cartilage is normal.

Joint space: No effusion is present.

Patellofemoral extensor mechanism: Normal.

Soft tissues: Normal.

IMPRESSION:

Normal knee.

**MR ANKLE**

TECHNIQUE: Multiplanar, multisequence imaging of the ankle without gadolinium.

COMPARISON:

INDICATIONS:

FINDINGS:

Ligaments: Distal tibiofibular syndesmosis is normal. Anterior talofibular, posterior talofibular, and calcaneofibular ligaments are normal. Deltoid and spring ligaments are normal.

Tendons: Peroneal, flexor, and extensor tendons are normal. Achilles tendon is normal.

Plantar fascia: Normal.

Sinus tarsi: Normal.

Bone marrow and joint space: No effusion or bone marrow edema is present.

Soft tissues: Normal.

IMPRESSION:

Normal ankle.
MR FOOT

TECHNIQUE: Multiplanar, multisequence imaging of the foot without gadolinium.

COMPARISON:

INDICATIONS:

FINDINGS:

Bone marrow and joint space: No bone marrow edema or effusion is present.

Muscles: No muscular edema or atrophy is present.

Ligaments: Normal.

Soft tissues: Normal.

IMPRESSION:

Normal foot.

MR HAND

TECHNIQUE: List sequence.

COMPARISON:

INDICATIONS:

FINDINGS:

Bone marrow and joint space: No bone marrow edema or effusion is present.

Muscles: No muscular edema or atrophy is present.

Ligaments: Normal.

Soft tissues: Normal.

IMPRESSION:

Normal hand.
MR UPPER OR LOWER EXTREMITY

TECHNIQUE: List sequence.

COMPARISON:

INDICATIONS:

FINDINGS:
Bone marrow and joint space: No bone marrow edema or effusion is present.
Muscles: No muscular edema or atrophy is present.
Soft tissues: Normal.

IMPRESSION:
Normal []

MR CERVICAL / THORACIC / LUMBAR SPINE

TECHNIQUE: List sequence.

COMPARISON:

INDICATIONS:

FINDINGS:
Bone marrow and disc spaces: No bone marrow edema or marrow replacing lesion is present. Discs are normal.
Spinal cord: Normal.
Central canal and neural foramina: No stenosis is present.
Paravertebral structures: Normal.

IMPRESSION:
Normal [] spine.
CT MUSCULOSKELETAL

TECHNIQUE: List sequence. Reformatted coronal and sagittal images.

COMPARISON:

INDICATIONS:

FINDINGS:

Bones and joint spaces: Normal.

Soft tissues: Normal.

IMPRESSION:

Normal [].

SHOULDER ARTHROGRAM

TECHNIQUE: Following explanation of the risks and benefits of the procedure, informed consent was obtained.

The anterior shoulder was prepped and draped using sterile technique. The subcutaneous tissues were anesthetized with lidocaine.

A 25-gauge needle was advanced into the glenohumeral joint using a rotator interval approach. A total of [] ml of dilute [gadolinium/contrast] was injected into the glenohumeral joint. The needle was removed without complications.

COMPARISON:

INDICATIONS:

FINDINGS:

Contrast is within the glenohumeral joint. No communication is seen with the subacromial/subdeltoid bursa.

IMPRESSION:

Successful fluoroscopic guided shoulder arthrogram. Please see [MR/CT] arthrogram to follow.
HIP ARTHROGRAM

TECHNIQUE: Following explanation of the risks and benefits of the procedure, informed consent was obtained.

The anterior hip was prepped and draped using sterile technique. The subcutaneous tissues were anesthetized with lidocaine.

A 22-gauge spinal needle was advanced into the hip joint at the femoral head/neck junction using an anterior approach. A total of [] ml of dilute [gadolinium/contrast] was injected into the hip joint. The needle was removed without complications.

COMPARISON:

INDICATIONS:

FINDINGS:

Contrast is within the hip joint.

IMPRESSION:

Successful fluoroscopic guided hip arthrogram. Please see [MR/CT] arthrogram to follow.

BONE AGE

COMPARISON:

INDICATIONS:

FINDINGS:

The patient is a [male | female] with a chronologic age of [#] years and [#] months.

Based on the standards of Greulich and Pyle, the patient’s bone age is [#] years and [#] months with a standard deviation of [#] months.

IMPRESSION:

**NEURORADIOLOGY**

**CT HEAD**

TECHNIQUE: Multiple axial images of the head without contrast.

COMPARISON:

INDICATIONS:

FINDINGS:

No acute infarction, hemorrhage, or mass effect is present. Brain parenchyma and ventricles are normal.

Extra-axial spaces are normal.

Vascular structures are normal.

Calvarium, skull base, and orbits are normal. Sinuses and mastoid air cells are well aerated.

IMPRESSION:

Normal CT head.

**CT MAXILLOFACIAL**

TECHNIQUE: Multiple axial images of the maxillofacial bones without contrast. Reformatted coronal and sagittal images.

COMPARISON:

INDICATIONS:

FINDINGS:

Orbits and maxillofacial bones are normal. Sinuses and mastoid air cells are well aerated.

Intracranial structures are normal.

Soft tissues are normal.

IMPRESSION:

Normal CT maxillofacial bones.
**CT SINUSES**

**TECHNIQUE:** Multiple axial and coronal images of the sinuses without contrast (If reformatted coronals – change to reflect).

**COMPARISON:**

**INDICATIONS:**

**FINDINGS:**

Sinuses and mastoid air cells are normal.

Osteomeatal complexes are patent. Nasal septum is midline.

Intracranial structures are well pneumatized and normal.

Osseos structures are normal.

**IMPRESSION:**

Normal CT of the sinuses.

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**CT CERVICAL / THORACIC / LUMBAR SPINE**

**TECHNIQUE:** Multiple axial images of the [] spine without contrast. Reformatted coronal and sagittal images.

**COMPARISON:**

**INDICATIONS:**

**FINDINGS:**

Bones and disc spaces: Vertebral structure, alignment, and disc spaces are normal.

Central canal and neural foramina: No central or foraminal stenosis is present.

Soft tissues: Normal.

**IMPRESSION:**

Normal [] CT of the spine.
CT NECK

TECHNIQUE: Multiple axial images of the neck following intravenous contrast. Reformatted coronal and sagittal images.

COMPARISON:

INDICATIONS:

FINDINGS:

Visualized intracranial structures are normal.

Suprahyoid and infrahyoid spaces: No mass or fluid collection is present. No lymphadenopathy is present. Thyroid normal.

Vascular structures are normal.

Musculoskeletal structures are normal.

Upper thorax is normal.

IMPRESSION:

Normal CT neck.

CT TEMPORAL BONES

TECHNIQUE: Multiple axial images of the temporal bones without contrast. Reformatted coronal and sagittal images.

COMPARISON:

INDICATIONS:

FINDINGS:

Right external auditory canal, tympanic membrane, and osseous labyrinth are normal. No erosions of the ossicles, scutum, or tegmen tympani are present. The mastoid air cells are well aerated.

Left external auditory canal, tympanic membrane, and osseous labyrinth are normal. No erosions of the ossicles, scutum, or tegmen tympani are present. The mastoid air cells are well aerated.

Cochlear and vestibular aqueducts are normal. No aberrant vessels. Facial nerve course is normal.

IMPRESSION:

Normal CT temporal bones.
**CT BRAIN PERFUSION**

TECHNIQUE: Routine brain perfusion following intravenous contrast.

COMPARISON:

INDICATIONS:

FINDINGS:

Cerebral blood flow is normal and symmetric.
Mean transit time is normal and symmetric.
Cerebral blood volume is normal and symmetric.

IMPRESSION:

Normal brain perfusion.

**MR BRAIN**

TECHNIQUE: List sequences.
Contrast: [ ] ml intravenous multihance

COMPARISON:

INDICATIONS:

FINDINGS:

No acute infarction, hemorrhage, or mass effect is present. Brain parenchyma and ventricles are normal.
Extra-axial spaces are normal.
Vascular structures are normal.
Calvarium, skull base, and orbits are normal. Sinuses and mastoid air cells are well aerated.

IMPRESSION:

Normal MRI brain.
MR PITUITARY

TECHNIQUE: List sequence.
Contrast: [ ] ml IV multihance with dynamic imaging.

COMPARISON:

INDICATIONS:

FINDINGS:

Pituitary gland is normal and infundibulum are normal. Parasellar structures and cavernous sinuses are normal.

No acute infarction, hemorrhage, or mass effect is present. Brain parenchyma and ventricles are normal.

Extra-axial spaces are normal.

Vascular structures are normal.

Calvarium, skull base, and orbits are normal. Sinuses and mastoid air cells are well aerated.

IMPRESSION:

Normal pituitary gland.
MR ORBITS

TECHNIQUE: List sequences.
Contrast: [ ] ml IV multihance.

COMPARISON:

INDICATIONS:

FINDINGS:

Globes, extraocular muscles, lacrimal glands, intra and extraconal structures are normal.
Optic nerve sheath/optic nerves are normal.
No acute infarction, hemorrhage, or mass effect is present. Brain parenchyma and ventricles are normal.
Extra-axial spaces are normal.
Vascular structures are normal.
Calvarium and skull base are normal. Sinuses and mastoid air cells are well aerated.

IMPRESSION:

Normal orbits.
MR INTERNAL AUDITORY CANALS

TECHNIQUE: List sequences.
Contrast: [ ] ml IV multihance.

COMPARISON:

INDICATIONS:

FINDINGS:
Internal auditory canals and inner ear structures are normal. Facial and vestibulocochlear nerves are normal. No cerebellopontine angle masses. Mastoids and middle ears are well pneumatized.
No acute infarction, hemorrhage, or mass effect is present. Brain parenchyma and ventricles are normal.
Extra-axial spaces are normal.
Vascular structures are normal.
Calvarium, skull base, and orbits are normal. Sinuses are well aerated.

IMPRESSION:
Normal MRI of the internal auditory canals.

MR NECK

TECHNIQUE: Multiplanar, multisequence imaging of the neck with 2D TDF images and 3D reconstruction pre and post gadolinium.
Contrast: [ ] ml IV multihance.

COMPARISON:

INDICATIONS:

FINDINGS:
Intracranial structures are normal.
Suprahyoid and infrahyoid spaces are normal. No pathologically enlarged lymph nodes are present.
Vascular structures are normal.
Musculoskeletal structures are normal.

IMPRESSION:
Normal neck.
MR BRACHIAL PLEXUS

TECHNIQUE: List sequence.
Contrast: [ ] ml IV multihance.

COMPARISON:

INDICATIONS:

FINDINGS:
Spinal cord is normal.
Brachial plexus is normal.
Muscles and tendons are normal.
No bone marrow edema or effusions are present.
Vascular structures are normal.

IMPRESSION:
Normal brachial plexus.

CODE STROKE/BAT CT HEAD

EXAM: Non-contrast CT head

LAST SEEN WELL (IF KNOWN):

CLINICAL INDICATIONS:

TECHNIQUE: Axial images from skull base to vertex were obtained without intravenous contrast.

COMPARISON:

FINDINGS:
BRAIN PARENCHYMA, VENTRICLES, MENINGES, AND DURA:

VASCULAR STRUCTURES:

CALVARIUM, SKULL BASE, ORBITS, PARANASAL SINUSES, AND MASTOIDS:

IMPRESSION:
1. RESULTS WERE CALLED TO DR. ________ AT _________ HOURS BY DR. ________.
MAMMOGRAPHY

MAMMOGRAM

COMPARISON:

INDICATIONS:

FINDINGS:

[Minimally, moderately, markedly] dense fibroglandular tissue is demonstrated. No masses, suspicious microcalcifications, or areas of architectural distortion are present.

IMPRESSION:

No evidence of malignancy.

ULTRASOUND BREAST

TECHNIQUE: Multiple sonographic images of the breast obtained.

COMPARISON:

INDICATIONS:

FINDINGS:

No solid mass or cyst is demonstrated. Normal fibroglandular tissue is present.

IMPRESSION:

Normal breast ultrasound.
ULTRASOUND-GUIDED BREAST BIOPSY

TECHNIQUE: Ultrasound evaluation of the [right/left] breast with special attention to the area of [sonographic/mammographic/palpable] concern, confirms the presence of a [ ] x [ ] cm mass at the [ ] o'clock position, approximately [ ] cm from the nipple, at a depth of [ ] cm from the skin.

Following explanation of the risks and benefits of the procedure, informed consent was obtained. The patient was positioned in the supine oblique position, and the lesion was localized with real-time sonography. The skin was prepped and draped using sterile technique. A total of [ ] ml of 1% lidocaine was used for local anesthesia. A [lateral/medial/oblique] approach to the target was used. A core biopsy [ ]-gauge needle was advanced to the preselected target. A total of [ ] biopsy specimens were obtained, with pre- and post-fire images documenting needle placement for each pass. Specimens were sent for pathologic analysis.

The patient tolerated the procedure well without complications. Following the procedure, the skin was cleansed and compressed. The patient was given post-biopsy instructions.

COMPARISON:

INDICATIONS:

FINDINGS:

Adequate samples obtained for pathology.

IMPRESSION:

Ultrasound-guided core biopsy of [right/left] breast mass.
STEREOTACTICALLY-GUIDED CORE BIOPSY

TECHNIQUE: A cluster of microcalcifications are located in the [right/left] breast at the [] o'clock position approximately [] cm from the nipple.

Following explanation of the risks and benefits of the procedure, informed consent was obtained. The patient was positioned prone on the stereotactic table, and the target was localized with digital images. A [] approach was used. The skin was cleansed using sterile technique. Cutaneous and subcutaneous anesthesia was achieved using [] ml of 1% lidocaine. A small scalp incision was made. A [-]-gauge needle was inserted, and accurate position was confirmed. A total of [] core biopsy specimens were obtained. Specimens were sent for pathologic analysis. The patient tolerated the procedure well without complications. Following the procedure, the skin was cleansed and compressed. The patient was given post-biopsy instructions.

COMPARISON:

INDICATIONS:

FINDINGS:
Adequate samples obtained for pathology.

IMPRESSION:
Stereotactically-guided core biopsy of [right/left] breast microcalcifications.

PREOPERATIVE NEEDLE LOCALIZATION

TECHNIQUE: Ultrasound evaluation of the [right/left] breast confirms the presence of a [] x [] cm mass at the [] o'clock position, approximately [] cm from the nipple, at a depth of [] cm from the skin.

Following explanation of the risks and benefits of the procedure, informed consent was obtained. The patient was positioned in the supine oblique position. The skin was prepped and draped using sterile technique. A total of [] ml of 1% lidocaine was used for local anesthesia. Using a [lateral/medial/superior/inferior] approach, a [] needle/wire assembly was used to localize the target under real-time sonographic guidance. A post-localization mammogram was obtained. The patient tolerated the procedure well without complications.

COMPARISON:

INDICATIONS:

FINDINGS:
Surgical specimen submitted for radiography demonstrates targeted lesion to be within specimen.

IMPRESSION:
Ultrasound-guided needle localization and documented excision of [left/right] breast mass.
**MR BREASTS**

**TECHNIQUE:** Multiplanar, multisequence imaging of the breasts pre and post gadolinium with dynamic imaging.
Contrast: [ ] intravenous [ ].

**COMPARISON:**

**INDICATIONS:**

**FINDINGS:**

Right breast demonstrates no mass, fluid collection, or architectural distortion.
Left breast demonstrates no mass, fluid collection, or architectural distortion.
No abnormal enhancement.

**IMPRESSION:**

Normal MRI of both breasts bilaterally.
BONE DENSITOMETRY

DENSITOMETRY

HISTORY:

TECHNIQUE: Bone mineral density (BMD) is measured in g/cm² (squared). BMD is the most accurate predictor of fracture risk. The key clinical result of bone densitometry is the T-score, which is a comparison to sex-matched patients with mean peak bone mass and is given in standard deviations (S.D.). Each -1 S.D. corresponds to approximately 10% bone loss. T-score has been validated for postmenopausal Caucasian women. This study is diagnostic quality, and alignment is within normal limits.

COMPARISON:

INDICATIONS:

FINDINGS:

Lumbar spine BMD is [] g/cm². T-score is [] and Z-score is []. WHO classification is [].

Total femur BMD is [] g/cm². T-score is [] and Z-score is []. WHO classification is [].

Femoral neck BMD is [] g/cm². T-score is [] and Z-score is []. WHO classification is [].

IMPRESSION:

Normal bone mineral density.
DENSITOMETRY (WITH COMPARISON)

HISTORY:

TECHNIQUE: Bone mineral density (BMD) is measured in g/cm² (squared). BMD is the most accurate predictor of fracture risk. The key clinical result of bone densitometry is the T-score, which is a comparison to sex-matched patients with mean peak bone mass and is given in standard deviations (S.D.). Each -1 S.D. corresponds to approximately 10% bone loss. T-score has been validated for postmenopausal Caucasian women. This study is diagnostic quality, and alignment is within normal limits.

COMPARISON:

INDICATIONS:

FINDINGS:

Lumbar spine BMD is [] g/cm². T-score is [] and Z-score is []. WHO classification is []. Previous lumbar spine BMD was [] g/cm².

Total femur BMD is [] g/cm². T-score is [] and Z-score is []. WHO classification is []. Previous total femur BMD was [] g/cm².

Femoral neck BMD is [] g/cm². T-score is [] and Z-score is []. WHO classification is []. Previous femoral neck BMD was [] g/cm².

IMPRESSION:

Normal bone mineral density.
ANGIOGRAPHY

CT/MR INTRACRANIAL ANGIOGRAM

TECHNIQUE: Routine intracranial angiogram with 3D reconstruction performed at separate workstation.
Contrast: [ ] ml intravenous [ ]

COMPARISON:

INDICATIONS:

FINDINGS:
Anterior circulation: No stenosis, occlusion, or aneurysm is present.
Posterior circulation: No stenosis, occlusion, or aneurysm is present.
Nonvascular: Normal.

IMPRESSION:
Normal CTA of the intracranial arteries.

CT/MR EXTRACRANIAL ANGIOGRAM

TECHNIQUE: Routine extracranial angiogram with 3D reconstructions performed at a separate workstation.
Contrast: [ ] ml intravenous [ ]

COMPARISON:

INDICATIONS:

FINDINGS:
Aortic arch: Origins of innominate, left common carotid, and left subclavian arteries are normal. Conventional branching thoracic aortic arch.
Right carotid: No stenosis dissection or occlusion is present.
Left carotid: No stenosis dissection or occlusion is present.
Vertebral arteries: No stenosis dissection or occlusion is present.
Nonvascular: Normal.

IMPRESSION:
Normal CTA of the extracranial arteries.
AORTA AND BILATERAL LOWER EXTREMITY RUNOFF

TECHNIQUE: Routine aortic angiogram and bilateral lower extremity runoff with 3D reconstructions performed at a separate workstation. Contrast: [ ] ml of intravenous [ ].

COMPARISON:

INDICATIONS:

FINDINGS:

Aorta and branches demonstrate no stenosis, occlusion, or aneurysm.

Right iliac, common femoral, superficial femoral, popliteal, anterior tibial, peroneal, and posterior tibial arteries demonstrate no stenosis or occlusion.

Left iliac, common femoral, superficial femoral, popliteal, anterior tibial, peroneal, and posterior tibial arteries demonstrate no stenosis or occlusion.

Nonvascular structures are normal.

IMPRESSION:

Normal CTA of the aorta and bilateral lower extremity arteries.