

**The University of Tennessee/Methodist Healthcare
Radiology Residency
Goals and Objectives**

The basic goal of the University of Tennessee/Methodist Diagnostic Radiology Program is produce a professional, confident, capable, academically strong and caring diagnostic radiologist. This person will realize that they are at the beginning of a career that involves life-long learning, change, and self-improvement. The path to resident graduation is a long road with a rich experience in the radiologic sciences. The resident is to be supported and guided by attending staff who provide appropriate friendly supervision and careful instruction with graduated responsibility.

Each subspecialty in radiology is taught by faculty members with responsibility in each area. Residents achieve increasing responsibility during each rotation. The rotation and goals of the program include:

ABDOMINAL RADIOLOGY GOALS AND OBJECTIVES:

The abdominal service provides experience with computed tomography, ultrasound, radiography, fluoroscopy, urography, cytography and endoscopic retragrade cholangio-pancreatography. During year one the residents receive several months of training in CT and abdominal radiology.

- **YEAR ONE**

At the end of year one, the resident should be able to demonstrate competencies in the following areas:

Knowledge Based Objectives:

- 1) Discuss the proper clinical and radiologic indications for the following studies:
 - a) barium swallow and esophagram
 - b) dysphagiagram
 - c) upper GI series
 - d) single contrast and air contrast barium enemas
 - e) small bowel follow-through
 - f) enteroclysis
 - g) ERCP
 - h) fistulogram
 - i) IV Urogram
 - j) cystogram
 - k) voiding cystourethrogram
 - l) hysterosalpingogram
- 2) State the physiologic properties, proper concentrations, improper indications for the use of the following contrast material:
 - a) barium
 - b) water soluble contrast material
 - c) ionic intravenous contrast media
 - d) nonionic intravenous contrast media
- 3) Discuss the following information about Glucagon:
 - a) proper indications and dosages in GI radiology
 - b) physiologic effects
 - c) side effects
 - d) contraindications
- 4) List the high risk factors for allergic reaction to IV contrast media.
- 5) State the proper assessment and treatment for allergic reaction to contrast media.
- 6) Recognize the normal radiographic appearance of structures of the GI and GU tract.
- 7) Given an appropriate radiograph – demonstrate a basic knowledge of radiographic abnormality of the GI and GU tract.

Technical Skills:

- 1) Demonstrate a basic knowledge of equipment used during fluoroscopy – this includes proper KV techniques, radiation safety features of the machines, and proper radiation safety techniques.
- 2) Demonstrate fluoroscopy techniques for performing the following procedures:
 - a) barium swallow, esophagram, and dysphagiagram
 - b) upper GI
 - c) single and air contrast barium enema
 - d) small bowel follow-thru
 - e) enteroclysis
 - f) ERCP
 - g) fistulogram
 - h) IV Urogram
 - i) cystogram
 - j) voiding cystourethrogram and retrograde urethrogram
 - k) hysterosalpingography
- 3) Demonstrate the knowledge of proper techniques, patient positioning, and type of films to be obtained for the described procedures.
- 4) Demonstrate initial development of fluoroscopic skills but with progression in skill in identifying more common abnormalities during the performance of the studies.

Decision-Making and Value Judgment Skills:

- 1) Review of history of the patient to be examined and determine the appropriateness of the exam requested.
- 2) Communicate with the referring physician about any recommendations for a change in the type of exam to be done.
- 3) Communicate with the technologist about any special additional views to be obtained to properly identify abnormalities.
- 4) Read and dictate the studies performed with the assistance of attending staff.
- 5) Communicate to the referring physician on the day of the exam any significant abnormalities identified on the examination.

• YEARS TWO – FOUR

During these years two-four of training, the resident should be able to demonstrate competency in the following areas:

Knowledge Based Objectives:

- 1) Demonstrate and review knowledge requirement of year one.
- 2) Describe and discuss GI and GU tract abnormalities in specific detail.

Technical Skills:

- 1) Demonstrate further development of technical skills at performing GI and GU tract studies.
- 2) Demonstrate improved technique for tube placement, technical performance and interpretation of enteroclysis procedures.
- 3) With fluoroscopy demonstrate the ability to identify the abnormalities.
- 4) Improve fluoroscopic techniques with decreasing time and increasing accuracy.

Decision-Making and Value Judgment Skills:

- 1) Demonstrate an enhanced ability to perform decision-making and value judgment requirements listed under the first year.
- 2) Evaluate and integrate data from other studies (CT, MRI, US, and nuclear medicine) of the GI and GU tract to make recommendations to the referring physician about more appropriate diagnostic studies needed.
- 3) Read and dictate studies with less assistance from attending staff – but with continued oversight throughout the residency.
- 4) Be able to consult with referring physicians about the appropriateness criteria for the various imaging modalities available for evaluation of the GI and GU tracts.

MUSCULOSKELETAL RADIOLOGY:

Musculoskeletal radiology is learned on the reading room, emergency, CT and MRI rotations with supervision by musculoskeletal radiologists.

- **YEAR ONE**

At the end of year one of training, the resident should be able to demonstrate competencies in the following areas:

Knowledge Based Objectives:

- 1) Discuss basic bone physiology.
- 2) Describe the stages different types of fractures go through in the process of healing.
- 3) List and describe the basic principles of the examination of musculoskeletal studies.
- 4) State the indications for computer tomography (CT), plain tomography, MRI, and isotope bone scans.

Technical Skills:

- 1) Identify most types of bone fractures and joint dislocations.
- 2) Recognize the commonly used radiographic projections in musculoskeletal radiology.
- 3) Identify normal musculoskeletal structures.

Decision-Making and Value Judgment Skills:

- 1) Determine adequacy of acquired musculoskeletal studies.
- 2) Evaluate stage of fracture healing.

- **YEARS TWO, THREE, AND FOUR**

At the end of years two-four of musculoskeletal training, the resident should be able to demonstrate competency in the following areas:

Knowledge Based Objectives:

- 1) Name and describe the various common types of bone and joint trauma, other than fractures.
- 2) Name and differentiate various forms of arthritis with inclusion of imaging, lab, and clinical features.
- 3) State the imaging features that differentiate benign and malignant bone tumors.
- 4) Name and describe clinical, pathological, radiologic features of congenital and acquired bone abnormalities.

THORACIC RADIOLOGY:

Thoracic radiology is taught on rotations of the reading room, computed tomography (CT), MRI, and emergency room (ER). At the end of year one most residents will have completed at least a month rotation in reading room, emergency radiology, and computed tomography. MRI experience is typically gained in years three and four.

- **YEAR ONE**

At the end of year one of training, the resident should be able to demonstrate competencies in the following areas:

Knowledge Based Objectives:

- 1) Identify normal anatomy of the chest seen on the radiograph and CT.
- 2) Identify and describe common normal variants.
- 3) Demonstrate a basic knowledge of radiographic interpretation.
- 4) Describe common diseases and their associated pulmonary patterns.
- 5) Describe the characteristics of common abnormal cardiac shadows.
- 6) Discuss reasons for doing a chest CT.

Technical Skills:

- 1) Given a chest radiograph or CT examination - distinguish normal from abnormal.
- 2) Dictate an appropriate, succinct report.
- 3) Communicate with referring physicians regarding exam results.
- 4) Recognize the following pathologic findings in the chest
 - a) air space disease
 - b) lobular processes
 - c) interstitial processes
- 5) Given a radiograph - recognize cardiac enlargement.
- 6) Identify anatomy and significant pathology on CT exams.

Decision-Making and Value Judgment Skills:

- 1) Make decisions about urgent exam results and need to communicate in an appropriate manner.
- 2) Increasing confidence in judgement of exam results but with continued staff supervision.
- 3) Determine need for additional studies and communicate this need to the referring physician.

- **YEARS TWO – FOUR**

At the end of years two-four of training, the resident should be able to demonstrate competency in the following areas:

Knowledge Based Objectives:

- 1) Name and describe characteristics of chest pathologies that are less common but have a distinctive radiographic or clinical sign.
- 2) Correlate pathologic and clinical data with radiographic findings.

Technical Skills:

- 1) Read chest radiographs with a high level of accuracy and efficiency.
- 2) Fully supervise the performance of a chest CT.

Decision-Making and Value Judgment Skills:

- 1) Understand and appropriateness criteria for various imaging modalities employed in thoracic imaging
- 2) Demonstrate a high degree of competency and comfort in communicating with referring physicians about the utilization of imaging studies of the thorax.

ULTRASOUND GOALS AND OBJECTIVES:

The dedicated ultrasound rotation includes peripheal vascular, abdominal, neonatal, obstetrical, post transplant and general ultrasounography.

- **YEAR ONE:**

At the end of year one of training, the resident should be able to demonstrate competencies in the following areas:

Knowledge Based Objectives:

- 1) Discuss thoroughly the ultrasound procedures and findings in:
 - a) liver/gallbladder/biliary tree ultrasound
 - b) pancreas/spleen/aortic/IVC ultrasound
 - c) liver & renal transplant ultrasound
 - d) renal ultrasound
 - e) pelvic ultrasound
 - f) neonatal cranial ultrasound
 - g) duplex doppler vascular studies
- 2) Discuss the basic ultrasound physics and instrumentation.
- 3) Describe the techniques routinely used to perform procedures.

Technical Skills:

- 1) Review patient history to determine appropriateness of requested exam.
- 2) Advise and assist technologist with special views or parameters to be followed pertinent to each patient.

Decision-Making and Value Judgment Skills:

- 1) Evaluate completeness and quality of exam and possible need for additional views.
- 2) Render preliminary interpretations to referring physicians.

- **YEARS TWO - FOUR**

At the end of years two-four, the resident should be able to demonstrate competency in the following areas:

Knowledge Based Objectives:

- 1) Demonstrate thorough knowledge of the ultrasound procedure through performing or assisting the sonographer with performance of the following studies:
 - a) liver/gallbladder/biliary tree ultrasound
 - b) pancreas/spleen/aortic/IVC ultrasound
 - c) liver & renal transplant ultrasound
 - d) renal ultrasound
 - e) pelvic ultrasound
 - f) neonatal cranial ultrasound
 - g) duplex doppler vascular studies
- 2) Given the appropriate sonogram, identify and discuss the abnormalities.
- 3) Discuss all aspects of ultrasound imaging; including indications, pathology, and correlative studies for each examination.

Technical Skills:

- 1) Review all scans for significant findings or abnormalities that may require additional views.
- 2) Review and dictate studies with attending staff.

Decision-Making and Value Judgment Skills:

- 1) Make preliminary decisions on exam results, communication with referring physicians, and recognize need to obtain assistance when appropriate.
- 2) Communicate with referring physicians about appropriateness criteria of ultrasound for patient assessment.

PEDIATRIC RADIOLOGY GOALS AND OBJECTIVES:

Pediatric radiology experience is provided with a three-month rotation at Le Bonheur Children's Medical Center and one month rotation at St. Jude Pediatric Research Medical Center. The pediatric rotations largely occur in the third and fourth years. At the end of the pediatric rotations the resident should be able to demonstrate competency in the following areas:

Knowledge Based Objectives:

- 1) Identify normal and abnormal airways on chest x-rays of the child or infant.
- 2) Recognize abnormalities associated with congenital heart disease on the chest radiograph or MRI.
- 3) Identify normal and abnormal skeletal structures.
- 4) Describe the proper procedure for fluoroscopy in an infant or older child.
- 5) Establish bone age on the basis of radiographic findings.
- 6) Describe positioning techniques and technical factors leading to optimal chest, abdomen, GI, and GU radiographs of infants and children.
- 7) Independently perform fluoroscopic exams on infants and children.
- 8) Review and dictate pediatric and neonatal exams with attending staff.

Technical Skills:

- 1) Perform fluoroscopic procedures and demonstrate knowledge of the appropriate contrast material to be used for children.
- 2) Determine bone ages and dictate findings.
- 3) Dictate imaging studies in appropriate manner with supervision.

Decision-Making and Value Judgment Skills:

- 1) Be able to communicate with referring physicians effectively using appropriateness criteria in the selection of imaging modalities to diagnose pediatric disease.
- 2) Recognize limitations in personal skills and knowledge.

MAMMOGRAPHY GOALS AND OBJECTIVES:

Mammography rotations are provided at Methodist University Outpatient Center, Germantown Outpatient Center, and Germantown Community Hospitals which are all FDA certified. Oversight and instruction is provided by dedicated breast imagers. There is experience in screening and diagnostic mammography, interventional procedures, ultrasound, and MR.

- At the end of four months rotation on Mammography, the resident should be able to demonstrate competencies in the following areas:

Knowledge Based Objectives:

- 1) Identify the normal and abnormal mammogram.
- 2) Discuss technical and physical factors unique to the production of a mammogram.
- 3) Make a preliminary review of mammograms and advise technologist on the need for additional films.
- 4) Be able to select a plan for follow-up protocol for probably benign lesions.
- 5) Select cases for appropriate ultrasound examination.
- 6) Interpret and perform ultrasound examinations.
- 7) Be aware of federal laws regarding mammography facilities and certification.

Technical Skills:

- 1) Interpret and dictate mammograms with attending radiologist.
- 2) Assist with and perform needle localizations of breast masses and calcifications.
- 3) Select lesions appropriate for stereotactic core biopsy and be able to perform these procedures with staff supervision.
- 4) Perform directed breast ultrasound with technologist assistance, and perform ultrasound guided interventional breast procedures.

Decision-Making and Value Judgment Skills:

- 1) Be able to use appropriateness criteria in consulting with referring physicians about the utilization of procedures and imaging techniques for evaluation of breast disease.
- 2) Recognize limitations in personal skill and knowledge and when to consult attending staff.

NUCLEAR MEDICINE GOALS AND OBJECTIVES:

University of Tennessee/Methodist residents obtain six months of nuclear medicine including both diagnostic and therapeutic procedures. A full range of diagnostic procedures are available, including CT/PET.

- At the end of six months of nuclear medicine rotation, the resident should be able to demonstrate competency in the following areas:

Knowledge Based Objectives:

- 1) Demonstrate a thorough knowledge of the clinical indications, general procedures, and scintigraphic findings in:
 - a) pulmonary imaging
 - b) hepatobiliary imaging
 - c) gastrointestinal imaging
 - d) musculoskeletal imaging
 - e) thyroid and parathyroid imaging
 - f) brain imaging and functional studies
 - g) tumor and abscess imaging
 - h) myocardial perfusion, MUGA, myocardial infarct imaging
- 2) Discuss the basic physical principals of nuclear medical imaging and instrumentation.
- 3) Identify the isotopes including physical and chemical properties that are used routinely in the compounding of radiopharmaceuticals for nuclear radiology procedures.
- 4) Identify and discuss indications for isotopes used for therapeutic purposes. This in particular, includes the protocol for safe monitoring and utilization.
- 5) Review and dictate all nuclear medicine studies with attending staff.
- 6) Discuss patient condition and patient monitoring requirements, particularly in relation to exercise and drug stress studies.
- 7) Process computer data obtained during cardiac stress studies.
- 8) Discuss the range of invasive and noninvasive tests, test characteristics, and prognostic value of tests used to evaluate cardiac disease.
- 9) Discuss the following information regarding all radiopharmaceuticals used in nuclear radiology procedures:
 - a) production of isotopes
 - b) physical properties of isotopes
 - c) generator, elution, and quality control
 - d) compounding of radiopharmaceuticals
 - e) radiochemical quality control
 - f) distribution and mechanism of localization
- 10) Describe the procedures and rationale for instrument quality control in nuclear medicine.

- 11) Discuss the state and federal rules and regulations that apply to the practice of nuclear radiology.
- 12) Describe the type of records that must be obtained in order to comply with federal and state guidelines for radiation safety and radioisotope receipt, use, and disposal.
- 13) Demonstrate an in-depth understanding of the physics of nuclear radiology.

Technical Skills:

- 1) Interpret and dictate exams with attending staff.
- 2) Assist with radioactive therapy treatments, making sure the consent form is completed properly, that the appropriate dose is administered, and that radiation safety practices are adhered to during the procedure.
- 3) Review all cases performed and be able to make judgements about need for additional views needed to obtain a diagnostic exam.
- 4) Be able to select the appropriate examination for evaluation of various types of disease.
- 5) Elute a generator and do appropriate quality control procedures.
- 6) Calculate and draw-up patient doses.
- 7) Demonstrate appropriate use of a survey meter to monitor radioactivity spills or other sources.
- 8) Perform a wipe test.
- 9) Perform quality control procedures on cameras, uptake probes, and dose calibrators.
- 10) Handle radiographic sources according to established guidelines.

Decision-Making and Value Judgment Skills:

- 1) Recognize limitations in personal skill and knowledge.
- 2) Make preliminary decisions on all matters of film interpretation and consultation; recognize the need for additional assistance from attending staff or for additional images.
- 3) Be able to communicate with referring staff regarding appropriateness criteria in deciding the work up of patients.
- 4) Carry out the practice of nuclear radiology with particular regard to quality control, quality assurance, and radiation safety for the patient and personnel.

CARDIOVASCULAR AND INTERVENTIONAL RADIOLOGY GOALS AND OBJECTIVES:

Cardiovascular and Interventional Radiology is performed as a combined neuroradiology and peripheral vascular interventional service. There are eight CAQ certified interventional radiologists and eight neuroradiologists and four interventional Neuroradiologists in the University of Tennessee/Methodist practice. Residents spend four to five months on this service. In addition there is one-month cardiac rotation at the Veteran's Administration Hospital. This exposes the resident to echocardiography and heart catheterizations.

- **YEAR ONE:**

At the end of year one, the resident should be able to demonstrate competency in the following areas:

Knowledge Based Objectives:

- 1) Demonstrate a thorough knowledge of clinical indications, procedures, and patient preparation for peripheral vascular and interventional procedures.
- 2) Demonstrate a basic knowledge of the vascular anatomy of the central nervous system and body.
- 3) Demonstrate basic organ base knowledge required to perform various interventional procedures such as percutaneous hepatic, gastric, and ureteral procedures.
- 4) Demonstrate a basic understanding of the technique involved in performing a variety of interventional and peripheral vascular procedures.
- 5) Demonstrate a basic understanding of the various medications used for sedation, anticoagulation, and thrombolysis in percutaneous therapy and interventional radiology.

Technical Skills:

- 1) Be able to obtain percutaneous access to either arterial or venous circulation for diagnosis and treatment.
- 2) Be able to position and perform percutaneous access to the biliary or renal collecting system.
- 3) Demonstrate manual dexterity and visual special skills at an introductory level for the performance of vascular interventional procedures.

Decision-Making and Value Judgment Skills:

- 1) Communicate with referring physicians about the appropriate utilization of vascular interventional procedures.
- 2) Perform pre-angiography and pre-intervention consultations and post-procedure follow-ups.

- **YEARS TWO – FOUR:**

At the end of years two-four, the resident should be able to demonstrate competency in the following areas:

Knowledge Based Objectives:

- 1) Demonstrate the ability to recognize pathology and offer potential treatments for a variety of conditions identified during vascular and interventional procedures.
- 2) Discuss criteria for modifying exams and/or therapies depending on the expected pathology or angiographic abnormalities.
- 3) Accurately interpret cardiac and vascular interventional procedures and be able to discuss and perform, a variety of additional diagnostic and therapeutic measures based on these findings.

Technical Skills:

- 1) Be able to perform basic vascular and interventional procedures, such as aorto-iliac runoffs, pulmonary angiography, nephrostomies, percutaneous transhepatic cholangiography, and percutaneous abscess drainage.
- 2) The resident should feel very comfortable with percutaneous access to the arterial or venous circulatory system and be competent in the treatment of localized complications (groin hematomas, pseudoaneurysm, dissection).
- 3) Feel comfortable in choosing a variety of catheters, guidewires, and other equipment needed to perform basic procedures.

Decision-Making and Value Judgment Skills:

- 1) Consult with referring physicians regarding vascular and interventional procedures.
- 2) Gradually make more advanced decisions to modify vascular and interventional procedures as needed under the supervision of attending staff.
- 3) Be able to effectively apply the appropriateness criteria for utilizing vascular and interventional procedures.

EMERGENCY RADIOLOGY GOALS AND OBJECTIVES:

Emergency radiology at University of Tennessee/Methodist is taught on rotations of emergency room, computed tomography (CT), and reading room. Also the Regional Medical Center is a Level I Trauma Center with a large volume of acute care patients and their associated imaging and interventions.

- **YEAR ONE:**

At the end of year one of training, the resident should be able to demonstrate competencies in the following areas:

Knowledge Based Objectives:

- 1) Identify normal anatomy of the chest as seen on CT and radiographs.
- 2) Identify and describe common variants of normal.
- 3) Demonstrate a basic knowledge of radiographic interpretation.
- 4) Discuss common diseases that give altered patterns of lung disorders.
- 5) Discuss the characteristics of common abnormal cardiac shadows.
- 6) Discuss the various reasons for ordering a chest CT.
- 7) Discuss basic bone physiology.
- 8) Discuss the stages different types of fractures go through in healing.
- 9) State the indications for CT, MRI, and bone scans.

Technical Skills:

- 1) Distinguish normal from abnormal on a Chest Radiograph
- 2) Dictate an acceptable report.
- 3) Communicate exam results to referring physicians.
- 4) Recognize the following pathologic findings in the thorax:
 - a) air space processes
 - b) lobular processes
 - c) interstitial processes
- 5) Given an appropriate radiograph - recognize cardiac enlargement.
- 6) Identify anatomy and significant pathology on CT exams.
- 7) Identify most types of bone fractures and joint dislocations.
- 8) Identify normal musculoskeletal structures and some normal variants.

Decision-Making and Value Judgment Skills:

- 1) Make decisions of when to alert attending staff to the immediacy of certain radiographic findings.
- 2) Determine when to repeat exams because of technical inadequacy.
- 3) Consult with confidence with referring physicians in regard to imaging results.
- 4) Given a radiograph of a healing bone fracture – determine the stage of bone healing.

- **YEARS TWO – FOUR:**

At the end of years two-four of training, the resident should be able to demonstrate competency in the following areas:

Knowledge based objectives:

- 1) Name and describe characteristics of chest pathologies that are seen infrequently in routine work but have a distinctive radiographic or clinical pathologic sign.
- 2) Correlate clinical and pathologic data with radiographic findings.
- 3) Name and describe the various types of bone and joint trauma, other than fractures.
- 4) Name and differentiate between various forms of arthritis including lab and clinical findings of each type.
- 5) State the radiographic features that differentiate benign from malignant bone tumors.
- 6) Name and describe clinical, pathological, and radiographic features of congenital and acquired bone pathologies.
- 7) Name and describe clinical, pathological, and radiological features of metabolic bone diseases.
- 8) Describe the radiographic features of inflammatory bone and joint diseases.

Technical Skills:

- 1) Interpret routine chest films with a high level of accuracy and efficiency.
- 2) Fully supervise the performance of a chest CT exam.
- 3) Given an appropriate radiograph – identify the following categories of bone pathology:
 - a) inflammatory processes
 - b) bone tumors
 - c) congenital and acquired diseases
 - d) metabolic diseases
- 4) Demonstrating increasing skill in selecting imaging pathways to examine musculoskeletal abnormalities.

Decision-Making and Value Judgment Skills:

- 1) Understand appropriateness criteria for imaging modalities used in thoracic imaging.
- 2) Consult with referring physicians about emergency imaging studies including appropriateness and cost of various modalities used to diagnose imaging modalities.

DIAGNOSTIC RADIOLOGY GOALS AND OBJECTIVES:

Diagnostic radiology is taught at University of Tennessee/Methodist on the rotations of reading room (plain film diagnosis), emergency room radiology, computed tomography, and magnetic resonance imaging

- **YEAR ONE:**

At the end of year one of training, the resident should be able to demonstrate competencies in the following areas:

Knowledge Based Objectives:

- 1) Identify normal anatomy of the chest as seen on the radiograph and CT.
- 2) Identify and describe common variants of normal.
- 3) Demonstrate a basic knowledge of radiographic interpretation.
- 4) Discuss various common diseases that give altered patterns of lung disorders.
- 5) Describe the characteristics of common abnormal cardiac shadows.
- 6) Discuss indications for performing a chest CT.
- 7) Discuss basic bone physiology.
- 8) Describe stages of fracture healing.
- 9) Indications and choices of imaging techniques in evaluation of musculoskeletal system.

Technical Skills:

- 1) Distinguish normal from abnormal on a chest film
- 2) Dictate a report that is brief and understandable.
- 3) Communicate imaging results with referring physicians
- 4) Recognize the following pathologic findings in the thorax:
 - a) air space processes
 - b) lobular processes
 - c) interstitial processes
- 5) Recognize cardiac enlargement.
- 6) Identify anatomy and significant pathology on CT exams.
- 7) Identify bone fractures and joint dislocations.
- 8) Recognize commonly used radiographic projections in musculoskeletal radiology.
- 9) Identify normal musculoskeletal structures and some of normal variants.

Decision-Making and Value Judgment Skills:

- 1) Make decisions about how to alert referring physician to the immediacy of a condition discovered by imaging.
- 2) Determine when to request additional imaging because of technical lack.

- 3) Demonstrate a high degree of accuracy in the interpretation and dictation of cases under attending staff guidance.
- 4) Consult with referring physicians in regard to most chest imaging procedures.
- 5) Evaluate need for additional exams in regard to musculoskeletal system.
- 6) Evaluate state of healing of healing bone fracture.

- **YEARS TWO – FOUR:**

At the end of years two-four the resident should be able to demonstrate competency in the following areas:

Knowledge Based Objectives:

- 1) Name and describe characteristics of chest pathologies seen less frequently but having distinctive radiographic pattern and clinical signs.
- 2) Correlate pathologic and clinical data with radiologic findings on chest films.
- 3) Name and describe various common bone and joint trauma other than fractures.
- 4) Name and differentiate various forms of arthritis including lab and clinical findings of each type
- 5) State radiologic features that differentiate benign and malignant bone tumors.
- 6) Name and describe pathological radiologic features of congenital and acquired bone pathologies
- 7) Name and describe clinical, pathological, and radiological features of metabolic bone disease.
- 8) Describe the radiographic features of inflammatory bone and joint disease.

Technical Skills:

- 1) Interpret chest films with a high level of accuracy and efficiency.
- 2) Fully supervise the performance of a chest CT exam.
- 3) Given an appropriate radiograph – identify the following categories of bone pathology:
 - a) inflammatory process
 - b) bone tumors
 - c) congenital and acquired diseases
 - d) metabolic diseases
- 4) Demonstrate increasing skill in interpretation of musculoskeletal images.

Decision-Making and Value Judgement Skills:

- 1) Understand appropriateness criteria for imaging modalities used in thoracic evaluation.
- 2) Increasing skill and comfort in consulting with referring physicians.
- 3) Understand appropriateness criteria for imaging modalities used in musculoskeletal evaluation.

COMPUTED TOMOGRAPHY GOALS AND OBJECTIVES:

- **YEAR ONE:**

At the end of year one of training, the resident should be able to demonstrate competencies in the following areas:

Knowledge Based Objectives:

- 1) Given normal CT images of the head, neck, spine, thorax, abdomen or pelvis demonstrate a proficient knowledge of anatomy of these regions.
- 2) Discuss the basic principles of CT physics.
- 3) Describe CT imaging protocols.
- 4) Given appropriate CT images: recognize basic pathologic findings and give differential diagnosis.
- 5) Give an accurate interpretation of information (both normal and abnormal) on CT images.

Technical Skills:

- 1) Screen, prescribe, and supervise CT imaging procedures.
- 2) Demonstrate proficiency in performance and interpretation of CT-guided biopsy procedures.
- 3) Demonstrate proficiency in performance and interpretation of lumbar, thoracic, and cervical myelograms.
- 4) Demonstrate proficiency in supervision of monitoring of conscious sedation during biopsy procedures.

Decision-Making and Value Judgement Skills:

- 1) Consult with referring physicians concerning more common pathologic processes that arise in imaging.
- 2) Perform pre-biopsy patient consultation and past procedure follow-ups.

- **YEARS TWO – FOUR:**

At the end of years two-four, the resident should be able to demonstrate competency in the following areas:

Knowledge Based Objectives:

- 1) Demonstrate the ability to recognize abnormalities and discuss a differential diagnosis.
- 2) Discuss criteria for modifying studies depending on the expected CT abnormalities.
- 3) Accurately interpret CT exams.

Technical Skills:

- 1) Screen, prescribe, and supervise routine CT imaging procedures.
- 2) Supervise patient sedation for imaging procedures.
- 3) Demonstrate proficiency in the performance and interpretation of imaging guided biopsies.
- 4) Demonstrate proficiency in recognizing and treating contrast reactions.
- 5) Demonstrate proficiency in the performance and interpretation of lumbar, thoracic, and cervical myelograms.

Decision Making and Value Judgement Skills:

- 1) Consult, with increasing confidence, with referring physicians in regard to CT imaging procedures.
- 2) Make decisions to modify CT protocols when abnormalities occur and follow through with performance and supervision of the procedure.
- 3) Consult with referring physician regarding appropriateness criteria for utilization of CT imaging.

COMPUTED TOMOGRAPHY GOALS AND OBJECTIVES:

- **YEAR ONE:**

At the end of year one the resident should be able to demonstrate competencies in the following areas:

Knowledge Based Objectives:

- 1) Given normal CT images of the head, neck, spine, thorax, abdomen or pelvis demonstrate a proficient knowledge of anatomy of these regions.
- 2) Discuss the basic principles of CT physics.
- 3) Describe CT imaging protocols.
- 4) Given appropriate CT images: recognize basic pathologic findings and give differential diagnosis.
- 5) Give an accurate interpretation of information (both normal and abnormal) on CT images.

Technical Skills:

- 1) Screen, prescribe, and supervise CT imaging procedures.
- 2) Demonstrate proficiency in performance and interpretation of CT-guided biopsy procedures.
- 3) Demonstrate proficiency in performance and interpretation of lumbar, thoracic, and cervical myelograms.
- 4) Demonstrate proficiency in supervision of monitoring of conscious sedation during biopsy procedures.

Decision-Making and Value Judgement Skills:

- 1) Consult with referring physicians concerning more common pathologic processes that might arise in imaging.
- 2) Perform pre-biopsy patient consultation and post-procedure follow-ups.

- **YEARS TWO – FOUR:**

At the end of years two-four, the resident should be able to demonstrate competency in the following areas:

Knowledge Based Objectives:

- 1) Demonstrate the ability to recognize abnormalities and discuss a differential diagnosis.
- 2) Discuss criteria for modifying studies depending on the expected CT abnormalities.
- 3) Accurately interpret CT exams.

Technical Skills:

- 1) Screen, prescribe, and supervise routine CT imaging procedures.
- 2) Supervise patient sedation for imaging procedures.
- 3) Demonstrate proficiency in the performance and interpretation of imaging guided biopsies.
- 4) Demonstrate proficiency in recognizing and treating contrast reactions.
- 5) Demonstrate proficiency in the performance and interpretation of lumbar, thoracic, and cervical myelograms.

Decision-Making and Value Judgement Skills:

- 1) Consult with increasing confidence, with referring physicians in regard to CT imaging procedures.
- 2) Make decisions to modify CT protocols when abnormalities occur and follow through with performance and supervision of the procedure.
- 3) Consult with referring physician regarding appropriateness criteria for utilization of CT imaging.

MAGNETIC RESONANCE IMAGING GOALS AND OBJECTIVES:

- **YEAR ONE:**

At the end of year one the resident should be able to demonstrate competencies in the following areas:

Knowledge Based Objectives:

- 1) Demonstrate a proficient knowledge of anatomy of the head, neck, spine, musculoskeletal system, chest, abdomen and pelvis.
- 2) Discuss basic principles of MRI physics.
- 3) Describe MRI protocols.
- 4) Recognize basic abnormalities and give a differential diagnosis.

Technical Skills:

- 1) Screen, prescribe, and supervise routine MR procedures.
- 2) Demonstrate proficiency for routine MR procedures.

Decision-Making and Value Judgement Skills:

- 1) Consult with referring physicians regarding more common pathologic processes to be evaluated.
- 2) Perform patient consultations and post procedure follow-ups.

- **YEARS TWO – FOUR:**

At the end of years two-four of training, the resident should be able to demonstrate competency in the following areas:

Knowledge Based Objectives:

- 1) Demonstrate increasing ability in recognizing abnormalities and discussing differential diagnosis.
- 2) Discuss criteria for modifying studies depending on expected abnormalities.
- 3) Accurately interpret MRI exams.

Technical Skills:

- 1) Screen, prescribe, and supervise routine MRI procedures.
- 2) Demonstrate proficiency in assisting with the management of contrast reactions.
- 3) Demonstrate proficiency in the performance and interpretation of intra-articular contrast injections utilized for MRI procedures (shoulder, elbow, knee).
- 4) Supervise and screen patient sedations for MRI.

Decision-Making and Value Judgement Skills:

- 1) Consult, with increasing confidence, with referring physicians as to results of MRI procedures.
- 2) Make decisions to modify MRI studies when unexpected abnormalities are discovered. Follow through with performance and supervision of the study.

Consult with confidence, with referring physicians regarding appropriateness criteria for utilizing MRI exams.