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# Body Imaging rotation

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The overall goal of the Body Imaging rotation is to provide the structure, framework, experience, and education a diagnostic radiology resident will need to correctly prescribe, perform, and interpret CT & MRI examinations of the chest, abdomen and pelvis. A key factor in successful interpretation is an understanding of the fundamentals of CT and MR imaging and the ability to tailor imaging protocols to address specific clinical questions. Residents will also develop the patient care and procedural skills to perform CT guided aspirations, drainages and biopsies and manage the potential complications of these procedures.

At the end of four years of training, the resident will be proficient at each of the following:

1. interpretation of all body MRI/ CT exams
2. performing/ prescribing CT and MRI protocols
3. describing CT scan acquisition techniques, multiplanar reformatting and 3D reformatting techniques
4. describing MRI scan acquisition techniques, sequences used for body MRI and MRA studies, and 3D reformatting techniques
5. correctly utilizing intravenous contrast agents
6. approval of and performance of CT-guided procedures and patient care
7. the management of adverse reactions to iv contrast agents

The curriculum described here concentrates on the abdomen and pelvis, although residents on rotation will also prescribe and interpret limited CT and MRI of the thorax as well. (The curricula and goals and objectives for Chest CT, high resolution chest CT and cardiac imaging, are covered in the Chest and Cardiac Curricula. Please refer to the goals and objectives for the chest rotation).

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### Body imaging core curriculum

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## BODY IMAGING 4 YEAR CORE LEARNING CURRICULUM LIST

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### LIVER

- Normal anatomy and variants
- Imaging methods and protocols
- Diffuse disease-fatty infiltration, cirrhosis, portal hypertension, hemochromatosis
- Focal benign masses-hemangioma, focal nodular hyperplasia, adenoma, abscess
- Focal malignant masses-hepatocellular carcinoma, metastases, fibrolamellar hepatocellular carcinoma, lymphoma

### SPLEEN

- Normal anatomy and variants
- Imaging methods and protocols
- Splenomegaly, asplenia, polysplenia
- Focal lesions-cyst, hemangioma, lymphangioma, abscess, neoplasm
- Splenic infarct
- Trauma

### PANCREAS

- Normal anatomy and variants-divisum, annular pancreas
- Imaging methods and protocols
- Pancreatitis-acute, chronic
- Neoplasm-adenocarcinoma, cystic neoplasms, IPMT, islet cell tumors, solid epithelial stromal tumor
- Trauma

### ADRENAL GLANDS

- Normal anatomy and function
- Imaging methods and protocols
- Hyperplasia
- Benign and malignant neoplasms
- Inflammatory disease

### KIDNEYS

- Normal anatomy and variants-cross fused ectopia, horseshoe kidney
- Imaging methods and protocols
- Inflammatory conditions-pyelonephritis, abscess, xanthogranulomatous pyelonephritis

- Cystic disease
- Benign and malignant masses
- Stone disease
- Trauma

#### **GALLBLADDER AND BILIARY TREE**

- Normal anatomy and variants
- Imaging methods and protocols
- Inflammatory disease
- Stone disease
- Neoplasm
- Congenital abnormalities-choledochal cysts, Caroli's disease

#### **PERITONEUM**

- Normal anatomy-compartments and spaces
- Ascites and hemoperitoneum
- Inflammatory processes-peritonitis, fibrosing mesenteritis, mesenteric panniculitis
- Omentum-infracts, carcinomatosis
- Neoplasm-mesothelioma, carcinoid, metastases

#### **RETROPERITONEUM**

- Normal anatomy and embryology
- Retroperitoneal and extraperitoneal spaces and spread of disease
- Inflammatory disease-fibrosis, abscess
- Hematoma
- Neoplasm

#### **GASTROINTESTINAL TRACT**

- Normal anatomy and embryology
- Methods of imaging and protocols
- Anatomic variants-malrotation, Meckel's diverticulum, duplications
- Inflammatory and infectious disease
- Neoplasm
- Bowel obstruction-including closed loop
- Ischemia
- Trauma

#### **LYMPHATIC SYSTEM**

- Anatomy-retrocrural, celiac, porta hepatic, retroperitoneal, mesenteric, pelvic, inguinal groups
- Cisterna chyli
- Inflammatory processes
- Neoplastic processes

#### **VASCULAR SYSTEM (AORTA, IVC, and BRANCH VESSELS)**

- Normal anatomy and variants
- Imaging methods and protocols
- Acute aortic syndromes
- Aneurysm, intramural hematoma, ulcerating plaque, dissection

- Stents, grafts, and stent grafts
- IVC thrombosis
- Major artery and vein thrombosis
- Gonadal vein thrombosis
- Pelvic congestion syndrome

#### **URETERS AND BLADDER**

- Normal anatomy and variants
- Imaging methods and protocols
- Benign processes-cystitis, atony, neurogenic bladder, stones, diverticulae
- Neoplasm
- Trauma-intra and extraperitoneal rupture

#### **PROSTATE AND SEMINAL VESICLES**

- Normal anatomy and variants
- Imaging methods and protocols
- Benign hypertrophy
- Abscess
- Neoplasm

#### **UTERUS AND ADNEXAE**

- Normal anatomy and variants-Mullerian duct abnormalities
- Imaging methods and protocols
- Benign ovarian masses and cysts
- Inflammatory processes-pelvic inflammatory disease
- Benign uterine conditions-fibroids, adenomyosis
- Gynecologic malignancy
- Correlation with pelvic ultrasound findings

#### **SOFT TISSUE PATHOLOGY:**

- Sarcoma
- Abscess
- Cellulites
- Hematoma
- Lipoma

#### **MANAGEMENT OF CONTRAST REACTIONS**

- Recognize and diagnose reactions to iodinated contrast
- Manage the spectrum of contrast reactions using appropriate support equipment, personnel, and pharmacologic agents
- Discuss the significance of contrast reaction with a patient
- Know the steroid prep regimens which can be used for prophylaxis
- Maintain BLS and ACLS certification

#### **PROCEDURE APPROVAL AND PERFORMANCE**

- Indications for biopsy of the liver, lung, kidney, adrenal, pancreas, omentum/other
- Contraindications to percutaneous biopsy
- Management of the coagulopathic patient
- Technique of image guided core needle biopsy, aspiration and drain placement
- Management of post biopsy bleeding, oversedation and pneumothorax

#### **SCAN ACQUISITION AND PRESCRIBING**

- Techniques used to time scan acquisition with respect to IV contrast

- Normal enhancement patterns of abdominal organs
- Enhancement characteristics of common tumors
- Enhancement characteristics of iodine and various gadolinium contrast agents
- Indications for positive and negative oral contrast

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## *Body CT Rotation #1, year one*

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### **Goals and Objectives: General Competencies**

#### **Patient Care**

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

- communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and families
- gather essential and accurate medical and radiologic history pertinent to the patients current issue
- work with all health care professionals to provide patient-focused care
- Discuss the indications, contraindications, risks, benefits, and alternatives of common abdominal imaging studies with referring providers and patients
- Discuss the indications, contraindications, risks, benefits, and alternatives of intravenous and oral contrast agents
- Prescribe oral steroid preps
- Recognize and treat mild contrast reactions
- Recognize and treat iv contrast extravasations
- Assimilate relevant history, signs and symptoms, physical exam findings to present a clear and relevant clinical history

#### **Assessment:**

- ⑩ Faculty evaluations
- ⑩ 360 degree review
- ⑩ Learning Portfolio

#### **Medical Knowledge**

Residents must demonstrate knowledge about established and evolving biomedical, clinical, and cognate sciences and the application of this knowledge to patient care. The first rotation focuses on CT imaging. By the end of this rotation, residents are expected to:

- Discuss the basic methods of CT scanning, including acquisition, standard reformats, phases of imaging, normal organ enhancement characteristics
- Describe Hounsfield units, window and level settings, lung and bone algorithm.
- Differentiate normal CT anatomy of the chest, abdominal, and pelvis from pathology
- Appropriately protocol standard algorithm CT and CTA of the chest, abdomen and pelvis based on clinical indication.

- Identify common pathology on CT scans of the chest, abdomen, pelvis:
  - Inflammation: diverticulitis, appendicitis, pancreatitis
  - Bowel obstruction
  - Lung & solid organ masses
  - Lymphadenopathy-size criteria by location
  - Renal calculi & hydronephrosis
  - Vascular aneurysm and occlusions
  - Intraperitoneal & retroperitoneal hemorrhage
- List the indications and uses of intravenous iodinated contrast material

**Assessment:**

Faculty evaluations  
 Dictation Evaluation  
 Learning Portfolio

**Practice-Based Learning and Improvement**

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

- apply knowledge of study designs and statistical methods to the appraisal of clinical studies and other information on the diagnostic effectiveness of CT/MRI and their role in patient care
- use information technology to investigate, access on-line medical information, and support their own education
  - Identify the electronic sites which are accurate and peer reviewed
  - Discuss the concept of medical literacy in the age of technology
  - List sites/apps which are NOT appropriate resources for medical knowledge, and discuss why
- facilitate the learning of students and other health care professionals
- demonstrate knowledge and use of medical informatics in patient care and education

**Assessment:**

Faculty evaluations  
 360 degree review  
 Learning Portfolio

**Interpersonal and Communication Skills**

Residents must demonstrate interpersonal and communication skills that result in effective information exchange with technologists, referring physicians, and other medical personnel. Residents are expected to:

- Dictate normal CT reports, with pertinent positives and negatives
- Dictate basic abnormal CT reports, with appropriate descriptors of organs and diseases, pertinent positives and negatives.
- Interact professionally and effectively with other health care professionals, including technologists, schedulers, nurses, students, residents, and physicians
- Interact effectively and sensitively with patients and family including
  - Greeting them appropriately & Introducing yourself and your role
  - Professional behavior, including attire, name badge and/or white coat
  - Explain imaging exams clearly, answer questions, and discussing results if indicated

- Communicate findings effectively with the referring clinicians. Document the communication of critical findings with medical personnel in a timely fashion. Describe the protocols for reporting:
  - Unexpected findings
  - Critical test
  - Critical results

**Assessment:**

Faculty evaluations  
 Dictation Evaluation  
 360 degree review  
 Learning Portfolio

**Professionalism**

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

- demonstrate respect, compassion, and integrity
- maintain an appropriate professional demeanor and bearing, including appropriate grooming and dress habits
- be punctual & work diligently
- demonstrate personal responsibility for:
  - Completing the daily workload
  - Taking charge of the section; fielding phone calls, running the service
  - Education-addressing deficits in knowledge
- Discuss and adhere to ethical principles pertaining to provision or withholding of clinical care, confidentiality of patient information, and business practices
- Recognize personal limitations as resident
- demonstrate a commitment to excellence and on-going educational and professional development and a commitment to self-directed study and learning
- demonstrate sensitivity and responsiveness to patients' culture, age, gender, and disabilities
- work with health care professionals, including those from other disciplines, to provide patient-focused care
  - Assess appropriateness of requested study, if not, suggest a viable alternative procedure to the referring physician with a logical explanation
- Recognize personal limitations as resident

**Assessment:**

Faculty evaluations  
 Conference attendance and participation  
 360 degree review  
 Learning Portfolio

**Systems-Based Practice**

Residents must demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value. Residents are expected to:

- Describe how their professional practice affects other health care professionals, the health care organization, and the larger society, and how these elements affect their own practice
  - Describe how their CT reports will directly and indirectly impact patient care
- Practice cost-effective health care and resource allocation that does not compromise quality of care. When appropriate, suggest alternative, less costly imaging tests which could answer the clinical question.
- Evaluate each request for imaging as regards cost, effectiveness, and appropriateness, and to facilitate performance of an alternative study if indicated.
- Be able to locate and use the ACR Appropriateness Criteria

**Assessment:**

- ⑩ Faculty evaluations
- ⑩ 360 degree review
- ⑩ Learning Portfolio

## *Body CT Rotation # 2, year one*

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**Goals and Objectives: General Competencies**

**Patient Care**

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

- communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- gather essential and accurate medical and radiologic history pertinent to the exam for which the patient is scheduled or for the examination that the patient has had
- work with health care professionals, including those from other disciplines, to provide patient-focused care
- Identify pathology in outpatients that requires contact with a referring physician before the patient can leave the department
- Observe the consent process for CT-guided procedures subsequent to performing.
- Practice appropriate patient care in the peri-procedural period (CT interventions).
  - Write succinct pre-procedure notes containing pertinent information
  - Obtain informed consent for procedures, including discussion of risks, benefits and alternatives
  - Describe and practice optimal post-intervention monitoring, care, and discharge
- Confirm that the requested body imaging study is appropriate and if not, then suggest a viable
- Recognize, manage, and document contrast extravasations and contrast reactions

**Assessment**

Faculty Evaluations

360 degree Evaluations  
Learning Portfolio

**Medical Knowledge**

Residents must demonstrate knowledge about established and evolving biomedical, clinical, and cognate sciences and the application of this knowledge to patient care. By the end of this rotation, residents are expected to:

- Describe the CT manifestations of common disease entities & their complications
  - Pancreatitis, appendicitis, diverticulitis
  - Organ and luminal ischemia
  - Traumatic injury to solid and visceral organs, skeleton, aorta and major branch vessels
  - Vascular dissection, aneurysm rupture
  - Cysts and solid masses in the solid organs. How to risk stratify cystic lesions in the kidneys and characterize adrenal masses.
  - Lymphadenopathy- locations, definitions, differential diagnosis.
  - Abscess, fluid collections, hemorrhage
  - Hernias and bowel ischemia
- Describe how to manage incidental findings in the solid abdominal organs and what resources guide these decisions
- Quickly recognizes emergent findings, including pneumothorax, hemoperitoneum, free intraperitoneal air, intestinal ischemia, active contrast extravasation
- Discuss the basic principles of CT angiography and the basic protocols of 3D reformatting
  - Describe how a CTA scan is acquired (planes, slice thickness, timing)
  - Describe how a CTA is interpreted (what slice thickness, which series to look for aneurysm, stenosis)
  - Describe the methods used to create 3D reformats
    - Define centerline reformat, curved planar reformats and when each is used
  - Observe a technologist performing 3D reformats; at least 3 cases
- Describe how and when to use the oral pre-medication protocol for IV contrast, and how to handle emergent IV contrast enhanced CTs in the patient with an allergy history
- Independently protocol CT examinations based on history and clinical indication, and explain the basis for each protocol
  - Explain when and why multiphase protocols are used in the solid abdominal organs
  - Define hypovascular and hypervascular tumors, list types, describe how this impacts diagnosis.
- Identify advanced anatomy:
  - Differentiate body compartments-peritoneal cavity, retroperitoneal spaces, extraperitoneum, and how they contribute to spread of disease in the abdomen.
- Optional: Observe informed consent for CT procedures, Perform simple, straight-forward biopsies and CT-guided abscess drainages, as deemed appropriate by the staff.

**Assessment**

Faculty evaluations

360 degree evaluations

Pre-Call Quiz, if applicable

ACR in-service examination, if applicable

Learning Portfolio  
Dictation Evaluation

### **Practice-Based Learning and Improvement**

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

- Apply knowledge of study designs and statistical methods to the appraisal of clinical studies and other information on the diagnostic effectiveness of CT/MRI for specific clinical indications.
- Use information technology to manage information, access on-line medical information, and support their own education
- Facilitate the learning of students and other health care professionals (medical students, residents from other disciplines, and college students will periodically rotate through body imaging)
  - Teach medical students rotating through body imaging basic imaging anatomy and pathology
  - Teach medical students about protocoling studies & the impact of a good patient history.
- locate, appraise, and assimilate evidence from scientific studies and apply these to individual cases
- demonstrate knowledge and use of medical informatics in patient care and education

### **Assessment**

Faculty evaluations  
360 degree evaluations  
Medical Student Evaluations  
ACR In-Service Exam  
Procedure Log  
Learning Portfolio

### **Interpersonal and Communication Skills**

Residents must be able to demonstrate interpersonal and communication skills that result in effective information exchange with technologists, referring physicians, and other medical personnel. Residents are expected to:

- work professionally and effectively with other health care professionals, including technologists, secretaries, schedulers, nurses, students, residents, and physicians
  - perform protocols in a timely fashion
  - treat others respectfully
- interact effectively and sensitively with patients, and with family members of patients. This includes:
  - greeting them appropriately, introducing yourself and your role, answering their questions
- Obtain informed consent for procedures:
  - Know the indication for procedure, pertinent labs & meds, complications
  - Explain the procedure to be performed, answer questions honestly and accurately
  - Be able to discuss the benefits, risks, and alternatives of the procedure
- Be able to present a concise, clear summary of patient history, physical findings, lab parameters, and previous diagnostic workup relevant to the imaging study before it is interpreted

- communicate findings effectively with the referring clinicians
  - communicate and document the communication of critical findings & critical tests with the appropriate medical personnel in a timely fashion
- Create clear, concise, intelligible radiology reports and recognize and address any errors
  - Discuss the pros and cons of using report templates
  - Describe what material belongs in the findings vs impression of a report
- Be able to discuss CT imaging in pregnancy
  - With the patient, with discussion of risks/benefits and alternatives
  - Obtain consent from the patient
  - With the ED physician ordering the exam/caring for the patient.

### **Assessment**

Faculty Evaluations

360 degree evaluations

Dictation Assessment

Learning Portfolio

### **Professionalism**

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

- demonstrate respect, compassion, and integrity
- maintain an appropriate professional demeanor and bearing, including appropriate grooming and dress habits
- be punctual & work diligently
- demonstrate personal responsibility for:
  - Completing the daily workload
  - Taking charge of the section; fielding phone calls, running the service
  - Education-addressing deficits in knowledge
- Discuss and adhere to ethical principles pertaining to provision or withholding of clinical care, confidentiality of patient information, and business practices
- Recognize personal limitations as resident
- demonstrate a commitment to excellence and on-going educational and professional development and a commitment to self-directed study and learning
- demonstrate sensitivity and responsiveness to patients' culture, age, gender, and disabilities
- work with health care professionals, including those from other disciplines, to provide patient-focused care
  - Assess appropriateness of requested study, if not, suggest a viable alternative procedure to the referring physician with a logical explanation
- Recognize personal limitations as resident

### **Assessment**

Faculty Evaluations

360 degree evaluations

Conference attendance and participation

Learning Portfolio

### **Systems-Based Practice**

Residents must demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value. Residents are expected to:

- Describe how their professional practice affects other health care professionals, the health care organization, and the larger society, and how these elements affect their own practice
  - Describe how their CT reports will directly and indirectly impact patient care
  - Describe the potential impact of incidental findings on the patient, their care, potential invasive procedures or additional imaging exams
  - Describe, locate, and use the recommendations of the ACR white paper on incidental findings
- Practice cost-effective health care and resource allocation that does not compromise quality of care. When appropriate:
  - Evaluate each request for imaging as regards cost, effectiveness, risk and appropriateness, and to facilitate performance of an alternative study if indicated.
- Be able to locate and use the ACR Appropriateness Criteria

### **Assessment**

Faculty Evaluations

360 degree evaluations

ACR In-Service Exam

Learning Portfolio

## *Body CT Rotation 3, year two*

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### **Goals and Objectives: General Competencies**

#### **Patient Care**

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

- communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- gather essential and accurate medical and radiologic history pertinent to the procedure for which the patient is scheduled or for the examination that the patient has had
- Practice appropriate patient care in the peri-procedural period (CT interventions).
  - Write succinct pre-procedure notes containing pertinent information
  - Obtain informed consent for procedures, including discussion of risks, benefits and alternatives
  - Describe and practice optimal post-intervention monitoring, care, and discharge
- work with health care professionals, including those from other disciplines, to provide patient-focused care

- Confirm that the requested body imaging study is appropriate and if not, then suggest a viable
- Recognize, manage, and document contrast extravasations and contrast reactions

### **Assessment**

Faculty evaluations

360 degree evaluations

ACR In-Service Exam

Learning Portfolio

### **Medical Knowledge**

Residents must demonstrate knowledge about established and evolving biomedical, clinical, and cognate sciences and the application of this knowledge to patient care. During this rotation, residents are expected to:

, intramural hematoma, closed loop obstruction, post operative complications

- Identify advanced anatomy:
  - Demonstrate the segments of the liver and be able to correctly describe the location of a lesion
  - Define the omentum, mesentery, mesenteric root
- Analyze and diagnose focal liver lesions on CT and MRI including:
  - hemangioma, adenoma, focal nodular hyperplasia
  - hepatocellular carcinoma (incorporating LIRADS)
  - hypervascular and hypovascular metastatic disease
- Analyze and diagnose diffusel liver disease on CT including:
  - Fatty infiltration, hepatitis, hemochromatosis, cirrhosis
- Analyze and diagnose focal pancreatic, splenic, adrenal and renal lesions on CT including:
  - Benign and malignant masses
  - Cystic masses (using the Bosniak classification when pertinent)
  - hemorrhage
- Identify and accurately report the findings pertinent to a vascular surgeon for each of the following:
  - AAA- pre and post treatment
  - Acute aortic syndromes – dissection, penetrating ulcer, intramural hemorrhage
- Appropriately protocol standard MRI exams of the abdomen and pelvis and explain the utility of each pulse sequence: MR enterography, dynamic liver, pancreas, renal, adrenal, MRCP, female pelvis
- Describe the screening process used at DHMC for identifying patients with high risk of renal insufficiency, to determine who needs a pre-CT creatinine checked
- Discuss the indications and contraindications for CT-guided chest, abdomen, and pelvic drains/aspirations/ biopsies
- Describe the medications and labs which are pertinent to know about, and check or stop prior to a CT guided intervention
- Perform percutaneous biopsies and simple drainages under the supervision of the attending radiologist, including the pre-procedure patient care and consent.
- Be proficient at the manipulation of both the PACS system and the Visage/Vital images workstation for the reconstruction of images for viewing in a multiplanar format.

**Assessment:**

Global ratings by faculty  
ACR in-service examination  
ABR written exam  
Procedure log  
Didactic lectures; conferences  
Learning Portfolio

**Practice-Based Learning and Improvement**

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

- Read about findings they missed during initial interpretations
- Apply knowledge of study designs and statistical methods to the appraisal of clinical studies and other information on the diagnostic effectiveness of CT/ MRI and CT-guided procedures and their role in the clinical care of the patient
- Use information technology to manage information, access on-line medical information, and support their own education
- Teach medical students and junior residents
  - Guide junior residents to appropriate protocol selection
  - Mentor junior residents on patient care, including extravasations and contrast reaction management.
- Assimilate evidence from scientific studies and apply to individual protocols and interpretations
- maintain a personal procedure log

**Assessment**

Faculty evaluations  
360 degree evaluations  
Medical Student Evaluations  
ACR In-Service Exam  
ABR Exam  
Procedure Log  
Learning Portfolio

**Interpersonal and Communication Skills**

Residents must be able to demonstrate interpersonal and communication skills that result in effective information exchange with technologists, referring physicians, and other medical personnel. Residents are expected to:

- work professionally and effectively with other health care professionals, including technologists, secretaries, schedulers, nurses, students, residents, and physicians
  - perform protocols in a timely fashion
  - answer questions respectfully
  - answer the phone professionally
- interact effectively and sensitively with patients, and with family members of patients. This includes:
  - greeting them appropriately, introducing yourself and your role

- Obtain informed consent for procedures:
  - Know the indication for procedure, pertinent labs & meds, complications
  - Explain the procedure to be performed, answer questions honestly and accurately
  - Be able to discuss the benefits, risks, and alternatives of the procedure
- Be able to present a concise, clear summary of patient history, physical findings, lab parameters, and previous diagnostic workup relevant to the imaging study before it is interpreted
- communicate findings effectively with the referring clinicians
  - communicate and document the communication of critical findings & critical tests with the appropriate medical personnel in a timely fashion
- Create clear, concise, intelligible radiology reports with NO errors
  - Effectively use report templates
  - Organize the information into logical sections
  - Include the pertinent positives and negatives in the 'findings' section
  - Draw a conclusion and give a differential diagnosis in the 'impression' section

### **Assessment**

Faculty evaluations

360 degree evaluations

Medical Student Evaluations

ACR In-Service Exam

ABR Exam

Procedure Log

Learning Portfolio

### **Professionalism**

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

- demonstrate respect, compassion, and integrity
- maintain an appropriate professional demeanor and bearing, including appropriate grooming and dress habits
- be punctual & work diligently
- demonstrate personal responsibility for:
  - Completing the daily workload
  - Taking charge of the section; fielding phone calls, running the service
  - Education-addressing deficits in knowledge
- Discuss and adhere to ethical principles pertaining to provision or withholding of clinical care, confidentiality of patient information, and business practices
- Recognize personal limitations as resident
- demonstrate a commitment to excellence and on-going educational and professional development and a commitment to self-directed study and learning
- demonstrate sensitivity and responsiveness to patients' culture, age, gender, and disabilities
- work with health care professionals, including those from other disciplines, to provide patient-focused care
  - Assess appropriateness of requested study, if not, suggest a viable alternative procedure to the referring physician with a logical explanation

- Recognize personal limitations as resident

#### **Assessment**

Faculty evaluations  
360 degree evaluations  
Medical Student Evaluations  
ACR In-Service Exam  
Procedure Log  
Learning Portfolio

#### **Systems-Based Practice**

Residents must demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value. Residents are expected to:

- Describe how their professional practice affects other health care professionals, the health care organization, and the larger society, and how these elements affect their own practice
  - Describe how their CT reports will directly and indirectly impact patient care
  - Describe the potential impact of incidental findings on the patient, their care, potential invasive procedures or additional imaging exams
  - Describe, locate, and use the recommendations of the ACR white paper on incidental findings
- Practice cost-effective health care and resource allocation that does not compromise quality of care. When appropriate:
  - Evaluate each request for imaging as regards cost, effectiveness, risk and appropriateness, and to facilitate performance of an alternative study if indicated.
- Demonstrate the value of the ACR Appropriateness Criteria to referring clinicians

#### **Assessment**

Faculty evaluations  
360 degree evaluations  
Medical Student Evaluations  
ACR In-Service Exam  
Procedure Log  
Learning Portfolio

### *Body CT Rotation 4, year three*

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#### **Goals and Objectives: General Competencies**

##### **Patient Care**

Residents must be able to provide patient care that is compassionate, appropriate, and effective for the diagnosis and treatment of illnesses of the chest, abdomen and pelvis. Residents are expected to:

- communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
- gather essential and accurate medical and radiologic history pertinent to the procedure for which the patient is scheduled or for the examination that the patient has had
- Perform procedures and peri-procedural patient care according to departmental guidelines, to include:
  - Appropriate approval of requests for CT procedures
  - Obtaining informed consent and completing the pre-procedure physical exam and documentation
  - Clearly explain any complications with the patient/family and the plan for management.
  - Direct the patients post-procedure care and follow up
- Recognize, manage and document contrast extravasation.
- Recognize, manage, and document events for patients having allergic reactions to contrast agents.

### **Assessment**

Faculty evaluations

360 degree evaluations

ACR In-Service Exam

Learning Portfolio

### **Medical Knowledge**

Residents must demonstrate knowledge about established and evolving biomedical, clinical, and cognate sciences and the application of this knowledge to patient care. During this rotation, residents are expected to:

- Teach detailed normal anatomy and basic pathology to students and junior residents
- Attend multidisciplinary conferences and be prepared to discuss cases, as well as using the information from conference to tailor patient exams
- Teach junior residents appropriate management of contrast reactions and extravasations
- Accurately analyze focal and diffuse pathology in the abdomen and pelvis as listed in the Body Imaging Curriculum
- Prescribe and interpret all body MRI examinations, including more complex cases involving the female pelvis, prostate and MRA
- Describe the pathways of disease spread within the abdomen & pelvis
  - Normal patterns of LN drainage
  - Normal patterns of venous drainage; portal and systemic
  - Recesses of the peritoneal cavity and their role in disease spread
- Appropriately recommend the use of MRI in the evaluation of indeterminate findings on CT, specifically:
  - Evaluate focal liver lesions, renal lesions, pancreas, uterine and adnexal pathology.
  - Compare and contrast the strengths and limitation of MRI and CT in the evaluation of masses in the solid abdominal organs.
- Describe the CT appearance of neoplastic and non-neoplastic processes of the mesentery and omentum.
- Explain the CT staging for common malignancies of the gastrointestinal tract

- Describe how a virtual colonoscopy is performed, including patient prep, CT technique, methods of interpretation. Be able to discuss the role of CT colonography with referring clinicians.
- List
- Apply the indications and contraindications for CT-guided chest, abdomen, and pelvic drains/aspirations/ biopsies to procedural requests, completing the procedure approval process and pre procedure workup.
- Perform percutaneous biopsies and drainages under the supervision of the attending radiologist, taking responsibility for all aspects of the case including workup, consent, performance, post procedure care and follow up

**Assessment:**

Global ratings by faculty  
 ACR in-service examination  
 ABR written exam  
 Procedure log  
 Didactic lectures; conferences  
 Learning Portfolio

**Practice-Based Learning and Improvement**

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

- Apply knowledge of study designs and statistical methods to the appraisal of clinical studies
  - technology assessment literature-describe what it is, how it influences our practice
  - Explain how to determine the diagnostic effectiveness of CT-guided procedures and their role in the clinical care of the patient
- Use information technology to supplement your learning. Discriminate sources based on the quality of the resource.
- Maintain a personal procedure log, including results of biopsy & personal complication and accuracy rates

**Assessment**

Faculty evaluations  
 360 degree evaluations  
 Medical Student Evaluations  
 ACR In-Service Exam  
 ABR Exam  
 Procedure Log  
 Learning Portfolio

**Interpersonal and Communication Skills**

Residents must be able to demonstrate interpersonal and communication skills that result in effective information exchange with technologists, referring physicians, and other medical personnel. Residents are expected to:

- work professionally and effectively with other health care professionals, including technologists, secretaries, schedulers, nurses, students, residents, and physicians
  - perform protocols in a timely fashion

- answer questions respectfully
- answer the phone professionally
- interact effectively and sensitively with patients, and with family members of patients. This includes:
  - greeting them appropriately, introducing yourself and your role
- Obtain informed consent for procedures:
  - Know the indication for procedure, pertinent labs & meds, complications
  - Explain the procedure to be performed, answer questions honestly and accurately
  - Be able to discuss the benefits, risks, and alternatives of the procedure
- Be able to present a concise, clear summary of patient history, physical findings, lab parameters, and previous diagnostic workup relevant to the imaging study before it is interpreted
- Create a clear, concise, intelligible radiology report devoid of errors
- communicate findings effectively with the referring clinicians
  - communicate and document the communication of critical findings & critical tests with the appropriate medical personnel in a timely fashion

### **Assessment**

Faculty evaluations

360 degree evaluations

Medical Student Evaluations

### **Professionalism**

Residents must demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient and professional population. Residents are expected to have achieved all of the defined components of professionalism outlined for the first 3 body imaging rotations (refer to above). In addition, by the end of their fourth rotation, they should:

- demonstrate personal responsibility for:
  - Running all facets of the body imaging service and relevant patient care
- work with any and all health care professionals, to provide patient-focused and most appropriate care:
  - Consult with ordering providers to recommend the best imaging test
  - Address patient questions and concerns
  - Document these communications in the medical record, as appropriate
- Strive to function at a fellowship level in terms of protocols, choice of contrast agents, relevant patient care issues (steroid preps, extravasation, contrast reactions), scan monitoring, dose reduction, communications, etc.

### **Assessment**

Faculty evaluations

360 degree evaluations

Medical Student Evaluations

### **Systems-Based Practice**

Residents must demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value. Residents are expected to:

- Describe how their professional practice affects other health care professionals, the health care organization, and the larger society, and how these elements affect their own practice
  - Describe how their CT reports will directly and indirectly impact patient care
  - Describe the potential impact of incidental findings on the patient, their care, potential invasive procedures or additional imaging exams
  - Describe, locate, and use the recommendations of the ACR white paper on incidental findings
- Practice cost-effective health care and resource allocation that does not compromise quality of care. When appropriate:
  - Evaluate each request for imaging as regards cost, effectiveness, risk and appropriateness, and to facilitate performance of an alternative study if indicated.
- Demonstrate the value of the ACR Appropriateness Criteria to referring clinicians

### **Assessment**

Faculty evaluations

360 degree evaluations

Medical Student Evaluations

Learning Portfolio

### **References:**

Fundamentals of Body CT, Webb, Brant, and Helms, 1997

Computed Body Tomography with MRI Correlation, 3rd edition. Lee, Sagel et al.

Dynamic Radiology of the Abdomen: Normal and Pathologic Anatomy,

Myers, M., Springer-Verlag New York LLC, 1996.