

Resident Core Curriculum

Thoraco-Abdominal Radiology: Body CT

General Goals: The specific goals include objectives required for every level of training with graduated levels of supervision and responsibility. All aspects of thoracoabdominal imaging are incorporated into the residency with a focus on CT imaging and diagnosis of the respiratory, cardiovascular, gastrointestinal and genitourinary tracts as well as the peritoneal cavity and retroperitoneum. During every training rotation, the resident will read the required literature and study the teaching file in thoracoabdominal radiology. Over time, the resident will become progressively more knowledgeable about normal radiographic anatomy, physiology of thoracoabdominal organs, and the radiological appearances of abdominal diseases. In addition, the resident will demonstrate a progressively increasing understanding of disease entities, their clinical presentations, and current modes of treatment.

Resident Daily Work Responsibilities (OVERALL BENCHMARKS/OBJECTIVES for Self-Evaluation)

1. Residents assigned to thoracoabdominal imaging will be available for consultations by CT technologists, clinicians, and other health care providers, except during conference times, when the attending faculty will cover.
2. Resident questions will be referred to the supervising faculty covering thoracoabdominal radiology.
3. Resident review of cases with the supervising faculty will be conducted as many times in the day as necessary to keep an efficient workflow.
4. All resident examinations will be dictated by the end of every working day.
5. Residents will check and sign his/her reports in a timely fashion prior to final verification by supervising faculty.
6. Residents must be familiar with the operation of all CT equipment.
7. Residents must acquire knowledge of radiation protection and ways to reduce radiation exposure to both patients and hospital personnel. The resident will be supervised to assure that safe practices are followed.
8. Residents must check examinations before the patient leaves the department if requested to do so by the supervising faculty.
9. Residents must become proficient at detecting thoraco abnormalities demonstrated by CT and be able to generate meaningful differential diagnosis.
10. Residents will learn current methods for performing CT diagnostic procedures.
11. Residents will become knowledgeable about the use of different CT radiographic contrast agents (including their indications, contraindications, dosages, and side effects).
12. Residents will acquire an understanding of the proper preparation of patients for examinations and appropriate follow-up afterward. At the start of every working day, the resident will be familiar with the patient schedule and anticipate need for any procedures. The resident will check requisitions for the next working day to evaluate for appropriateness of the requested procedure or if additional exams/protocols need to be performed. Absent clinical indication or seemingly inappropriate requests will be clarified and discussed with the referring physician.
13. Residents will do in-depth reading and study, along with a review of teaching file cases, to become knowledgeable about the normal anatomy and physiology of thoracoabdominal organs and the radiologic appearances of respiratory, cardiovascular, gastrointestinal and genitourinary tracts as well as the peritoneal cavity and retroperitoneum, and gain a general understanding of the disease entities, their clinical presentations, and certain modes of treatment.

14. Residents will serve as a secondary consultant to referring physicians regarding thoracoabdominal imaging. This will strengthen the confidence of the resident in the very important role every radiologist must perform throughout his/her career as a consultant to clinicians.
15. Residents will become prepared to pass the certifying examination of the American Board of Radiology.
16. Residents will teach and share knowledge to medical students, radiologic technologist students, and junior residents.
17. Residents will participate in the preparation and presentation of imaging studies at the monthly Interesting Case Conference.

Supervising Faculty Responsibilities:

1. Supervising faculty will be available at all times for any questions or consultations needed by the resident.
2. Supervising faculty will review all cases with the residents before the end of the day.
3. Supervising faculty will provide the resident with constructive feedback in any problem areas encountered during the rotation.
4. Supervising faculty will verify resident-generated reports in a timely manner and inform the resident of any major changes made.

Educational Goals and Objectives (First Year Residents):

Patient Care:

- Adequately explain each examination to the patient in order to ensure that the patient feels comfortable and to provide patient care that is compassionate, appropriate, and effective
- Familiarity with the operation of CT equipment
- Aware of the basic principles of radiation protection in order to reduce as much as possible the radiation dose to the patient and reduce exposure to healthcare providers
- Understand the indications for and contraindications to use of intravenous radiographic contrast, and be able to monitor its administration
- Recognize and treat reactions to intravenous contrast
- Understand the indications and contraindications to the different types of contrast, dosages, side effects, and the differences and relative merits of single and double contrast studies
- Develop a knowledge of the preparation and aftercare required for the common examination
- Use the PACS, voice recognition systems, and hospital information systems to become proficient in dictating reports of significant radiographic findings in a concise and clear manner
- Demonstrate the ability to recommend additional imaging studies as appropriate to better assess findings on thoracoabdominal imaging studies

Medical Knowledge:

- Learn the basic physics and principles of radiography, CT, and spinal CT, especially as it pertains to phases of enhancement of the liver and kidney
- Observe and learn the techniques and protocols to achieve high-quality diagnostic examinations of the respiratory, cardiovascular, gastrointestinal and genitourinary tracts as well as the peritoneal cavity and retroperitoneum.
- Develop knowledge of normal and abnormal anatomy of the chest, abdomen, pelvis, and peritoneal/retroperitoneal spaces as demonstrated on contrast studies. In addition, venous anomalies of the IVC and other variants will be recognized
- Become knowledgeable about the different contrast agents available and begin to recognize abnormalities that are demonstrated on abdominal CT studies of the alimentary tract

- List the risk factors for allergic reaction to intravenous contrast media
- State the proper assessment and treatment for allergic reactions to contrast media
- Develop a knowledge of the differential diagnoses of the more commonly encountered abnormalities
- Demonstrate the ability to recognize and describe common medical conditions depicted on thoracoabdominal imaging studies
- Recognize the clinical question and the studies prescribed to answer the question
- Participate in every case that is checked out, especially those call cases checked out between 7:30 – 9:00 AM, as well as trauma cases.
- Develop an approach to ruling in or out an abscess

Practice-Based Learning and Improvement:

- Show evidence of independent study using textbooks from reading list
- Demonstrate appropriate follow up of interesting cases
- Research interesting cases as directed by faculty
- Identify, rectify, and learn from personal errors
- Incorporate feedback into improved performance
- Efficiently use electronic and print sources to access information
- Demonstrate understanding of protocols specific to each part of the body

Interpersonal and Communication Skills:

- Communicate with the patient at all times during the examination to ensure that patient remains comfortable
- Communicate effectively with all members of the health care team (technologists, medical students, fellows, residents, allied health providers, support staff, and attending physicians/radiologists)
- Call results to the referring physicians and show ability to interact with referring physicians
- Interact with clinicians when reviewing cases involving radiographs and thoracoabdominal imaging studies and show ability to provide preliminary readings, follow up with attending radiologists, formulate a plan of complex cases, and communicate any changes to referring clinicians

Professionalism:

- Demonstrate respect for patients, families, and all members of the healthcare team and be able to discuss significant radiology findings
- Explain the impact of the radiology findings on patient care, including what imaging studies may/may not be appropriate
- Respect patient confidentiality at all times
- Present oneself as a professional in appearance and communication
- Demonstrate a responsible work ethic with regard to work assignments

System-Based Practice:

- Able and willing to participate in clinical conferences in which imaging studies are used to guide patient care/evaluations and be able to demonstrate understanding of how imaging relates to the clinical care of the patient
- Demonstrate knowledge of the ACR practice guidelines and technical standards for CT
- Demonstrate knowledge of ACR appropriateness criteria and cost effective imaging evaluation of common disorders
- Show ability to interact with clinicians regarding cost effective and streamlined evaluation for differing clinical entities

Monitoring and Assessment of Resident Performance

The resident's progress will be monitored by the faculty on the service. Toward the end of each rotation, the resident will receive an evaluation of performance from each attending. Deficiencies or substandard performance will be discussed personally and privately with the resident and will be brought to the attention of the Residency Program Director by the attending radiologist. Residents are evaluated monthly by faculty. Resident performance is also evaluated through direct observation, case logs, multi-source professional evaluations, structured case discussion, review of patient outcomes, and other performance evaluation methods as determined.

Educational Goals and Objectives (Second Year Residents):

The objectives above as well as the following:

Patient Care:

- Understand the physics of radiation protection and how to apply it to routine studies
- Obtain consent for more complex procedures and answer all questions the patient may have
- Develop a knowledge of the preparation and aftercare required for more complex procedures
- Continue to improve skills for performing CT examinations, and tailor examinations to answer all questions being asked by the clinician; anticipate those questions that should have been asked but were not
- Demonstrate knowledge of indications for the examinations requested (when the reason for the examination is not clear, the resident will effectively communicate with the patient and referring physician until clarified)
- Familiarity with available medical records and how to access them for the purposes of patient care
- Protocol cases, in consultation with the attending, to assure that the CT examination is appropriate and of sufficient quality to address the clinical concerns of the patient and referring physician
- Review all studies with the supervisor faculty attending
- Provide preliminary reports to all referring clinicians if needed before the final review of cases (when there is a significant discrepancy between the preliminary reading and final reading, the resident will notify the referring clinician immediately)

Medical Knowledge:

- Recommend the appropriate study based on the clinical scenario
- Familiarity with the anatomy of the organs examined in every case
- Familiarity with imaging findings of common acute and chronic chest, abdomen, pelvis and peritoneal/retroperitoneal space diseases evaluated with CT
- Identify pathology in order to interpret routine CT studies with accuracy appropriateness to the level of training when presenting to the attending
- Distinguish between normal and abnormal chest, abdomen, pelvis and peritoneal/ retroperitoneal space anatomy to level of training when presenting to the attending
- Plan and monitor all body CT exams with a fellow or attending radiologist available at all times for consultation
- Determine whether old exams are available and review them when possible prior to the patient's CT examination
- Decide whether IV contrast is needed and determine the appropriate dosage and delivery rate. Repeat scans with repositioning or reinjection may be needed to resolve issues

- Serve as a consultant and review studies with referring clinicians as well as showing initiative in planning and performing interventional procedures
- Understand mediastinal masses, CT of unresectable lung cancer, solitary pulmonary nodule, solitary liver mass, pancreatic neoplasms, adrenal masses, staging renal cell cancer, as well as cancers of the endometrium, cervix, vagina, and the prostate

Practice-Based Learning and Improvement:

- Identify, rectify and learn from personal errors
- Incorporate feedback into improved performance
- Demonstrate evidence of independent reading and learning through use of printed and electronic resources
- Follow up on abnormal or interesting cases through personal communication with the referring physician or patient medical records
- Competent in using PACS, voice recognition systems, and the patient information systems in the daily accomplishment of the workload and instruct others in their use

Interpersonal and Communication Skills:

- Appropriately obtain informed consent
- Produce concise reports that include all relevant information
- Communicate effectively with all members of the healthcare team
- Communicate effectively the results of studies to referring clinicians whenever needed (for emergent studies, this will be accomplished in a timely manner)
- Effectively convey the findings of examinations through accurate dictation of reports

Professionalism:

- Demonstrate respect for patients and all members of the healthcare team (CT technologists, nurses, and other healthcare workers)
- Respect patient confidentiality at all times
- Present oneself as a professional in appearance and communication
- Demonstrate a responsible work ethic in regard to work assignments
- Explain the nature of the examination or findings in an examination to patients and their families when needed
- Observe ethical principles when recommending further work-up
- Promptness and availability at work are required of every resident
- Dress appropriately for work

Systems-Based Practice:

- Demonstrate knowledge of ACR practice guidelines and technical standards for CT examinations
- Demonstrate knowledge of ACR appropriateness criteria and cost-effective imaging evaluation of thoracoabdominal disorders
- Familiarity with departmental procedures, contrast safety, and sedation required in the performance of examinations
- Use appropriate language in communicating to clinicians through reports or consultations so proper management decisions can be made
- Thorough dictations will be made with indications, techniques, findings, and conclusions
- Dictate and correct reports in a timely fashion to avoid delay in patient disposition
- Recognize the role that CT plays in the management of acute and chronic diseases
- Make suggestions to improve methods and systems utilized in radiology whenever appropriate

Monitoring and Assessment of Resident Performance

The resident's progress will be monitored by the faculty on the service. Toward the end of each rotation, the resident will receive an evaluation of performance from each attending. Deficiencies or substandard performance will be discussed personally and privately with the resident and will be brought to the attention of the Residency Program Director by the attending radiologist. Residents are evaluated monthly by faculty. Resident performance is also evaluated through direct observation, case logs, multi-source professional evaluations, structured case discussion, review of patient outcomes, and other performance evaluation methods as determined.

Educational Goals and Objectives (Third Year Residents):

The above objectives as well as the following:

Patient Care:

- Perfect diagnostic examination techniques and be very skilled and efficient in performing and interpreting all diagnostic and interventional procedures performed in CT
- Demonstrate knowledge of indications for the examinations requested (when the reason for the examination is not clear, the resident will effectively communicate with the patient or referring physician until clarified)
- Familiarity with available medical records and how to access them for the purposes of patient care
- Protocol cases, in consultation with the attending, to assure that the CT examination is appropriate and of sufficient quality to address the clinical concerns of the patient and referring physician
- Review all studies with the supervising faculty attending
- Provide preliminary reports to all referring clinicians if needed before the final review of cases (when there is a significant discrepancy between the preliminary reading and final reading, the resident will notify the referring clinician immediately)
- Show involvement in CT-guided intervention involving the thoracoabdominal and assist the attending radiologist as appropriate

Medical Knowledge:

- Develop a thorough knowledge of the differential diagnosis of CT abnormalities
- Relate the imaging findings to the clinical condition and its pathology
- Understand the clinical management of the conditions encountered
- Familiarity with the anatomy of the organs examined in every case
- Familiarity with imaging findings of common acute and chronic chest, abdomen, pelvis and peritoneal/retroperitoneal space diseases evaluated with CT
- Identify pathology in order to interpret CT imaging studies with accuracy appropriateness to the level of training when presenting to the attending
- Distinguish between normal and abnormal thoracoabdominal anatomy particularly as seen on CT images, with excellent accuracy according to the level of training when presenting to the attending and demonstrate improvement compared to the prior rotation
- Proficient in detecting abnormalities on thoracoabdominal plain radiographs and CT studies while in progress
- Development of appropriate differential diagnostic lists will be well advanced
- Continue to develop skills in interventional procedures under the guidance of more experienced

radiologists

- Know the proper preparation of patients for diagnostic and interventional procedures and the appropriate follow-up afterwards
- Act as a consultant in thoracoabdominal radiology to the clinical services
- Obtain a broad understanding of thoracoabdominal and alimentary tract diseases, their clinical features, radiographic manifestations, and current modes of treatment

Practice-Based Learning and Improvement:

- Identify, rectify, and learn from personal errors
- Incorporate feedback into improve performance
- Demonstrate evidence of independent reading and learning through use of printed and electronic resources
- Follow up on abnormal or interesting cases through personal communication with the referring physician or patient medical records
- Competent in using PACS, voice recognition systems, and the patient information systems in the daily accomplishment of the workload and instruct others in their use

Interpersonal Skills:

- Appropriately communicate results to patients and clinicians whenever needed (for emergent studies, this will be done in a timely manner)
- Produce concise reports that include all relevant information and be able to effectively convey the findings of examinations through accurate dictation of reports
- Communicate effectively with all members of the healthcare team
- Assist with supervision and teaching of medical and radiology technologist students

Professionalism:

- Demonstrate respect for patients and all members of the healthcare team (CT technologists, nurses, and other healthcare workers)
- Respect patient confidentiality at all times
- Present oneself as a professional in appearance and communication
- Demonstrate a responsible work ethic in regard to work assignments
- Explain the nature of the examination of findings in an examination to patients and their families when needed
- Observe ethical principles when recommending further work-up for cases
- Promptness and availability at work are required of every resident
- Dress appropriately when reporting to work

Systems-Based Practice:

- Demonstrate knowledge of ACR practice guidelines and technical standards for thoracoabdominal CT
- Demonstrate knowledge of ACR appropriateness criteria and cost effective imaging practices in the evaluation of chest, abdomen, pelvis and peritoneal/retroperitoneal space disorders
- Complete final preparations to pass the certifying examination of the American Board of Radiology
- Familiarity with departmental procedures, contrast safety, CT safety, and sedation required in the performance of examinations
- Use appropriate language in communicating to clinicians through reports or consultations so proper management decisions can be made
- Produce thorough dictations with indications, techniques, findings, and conclusions
- Dictate and correct reports in a timely fashion to avoid delay in patient disposition

- Recognize the role that CT plays in the management of acute and chronic diseases
- Make suggestions to improve methods and systems utilized in radiology whenever appropriate

Monitoring and Assessment of Resident Performance

The resident's progress will be monitored by the faculty on the service. Toward the end of each rotation, the resident will receive an evaluation of performance from each attending. Deficiencies or substandard performance will be discussed personally and privately with the resident and will be brought to the attention of the Residency Program Director by the attending radiologist. Residents are evaluated monthly by faculty. Resident performance is also evaluated through direct observation, case logs, multi-source professional evaluations, structured case discussion, review of patient outcomes, and other performance evaluation methods as determined. In addition, practical exams will be given to residents toward the end of the rotation with feedback provided to residents regarding the progress made.

Conference Schedule:

Tuesday 1:00 PM: Chest Conference

Wednesday 3:00 PM: GYN Conference

Thursday 7:00 AM: GI Tumor Board

Reading List for Each Year

First Year

1. W. Richard Webb, William E. Brant, and Clyde A. Helms. *Fundamentals of Body CT*, W. B. Saunders Company, 2006. (This will be read twice in the first month.)

Second Year

2. Joseph K.T. Lee, Stuart S. Sagel, and Robert J. Stanley. *Computed Body Tomography with MRI Correlation*. Lippincott Williams & Wilkins; 4th Edition, 2003
3. Slone RM, Fisher, AJ, Pickhart PJ, Guitierrez F, Balfe DM; *Body CT: A Practical Approach* McGraw-Hill Professional; 1st edition (December 1, 1999) Elias Zerhouni, *CT & MRI of the Thorax*. Churchill and Livingstone, 1990.

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