



Curriculum in Chest Radiology (revised 6/13/08)

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Core lecture series in Chest Radiology

Core lectures Weekly year round Monday 7:30pm at SLH / Wednesday at TMC

1. Introduction to Chest Imaging Series
2. Normal Imaging Anatomy Series
3. The Normal PA Chest Radiograph Series - Mediastinal Lines, Stripes / Interfaces
4. Nomenclature for Chest Imaging
5. The Normal Lateral Chest Radiograph
6. Lesion Localization on Radiography
7. Bedside Chest Radiography and Life Support Devices
8. Atelectasis and Volume Loss
9. Imaging of Heart Failure
10. Chest Imaging in Trauma
11. CT Pulmonary Angiography - Pulmonary Thromboembolic Disease
12. Pulmonary Hypertension
13. Pulmonary Infections
14. Pulmonary Neoplasms - Imaging, Diagnosis and Staging
15. Interstitial Lung Disease
16. Mediastinal Masses
17. Mediastinal Lymph Nodes (ATS Classification)
18. Pleural Disease - Neoplastic
19. Pleural Disease - Non-Neoplastic
20. Normal Pericardium and Pericardial Abnormalities
21. Congenital Lesions of the Lung
22. Imaging Assessment of the Solitary Pulmonary Nodule
23. The Post-Surgical Chest
24. Chest Disease in Immunocompromised Patients
25. Lymphoproliferative Disorders of the Chest
26. Acquired Diseases of the Aorta

This curriculum is supplemented by the following interdisciplinary lectures:

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| 1. Weekly | Case Conference |
| 2. Weekly | Didactic Lecture |
| 3. Monthly | Journal club |
| 4. Weekly | Reading Room Chest Case Conference |

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| 5. Weekly | Reading Room Case Discussion Workshop |
| 6. Bimonthly | Resident Presentation |
| 7. Monthly | Emergency Radiology Case Conference |

Chest Radiology – Rotation 1

General overview:

Radiology resident rotations in chest radiology will include at least 4 months during the residency program. These rotations will take place at Saint Luke's Hospital of Kansas City and at Truman Medical Center. Completion of specific goals and objectives is required for every level of training with graded supervision by the attending faculty. All aspects of chest radiology will be incorporated into the residency, including the performance and interpretation of radiography, computed tomography and magnetic resonance imaging. In addition, training on thoracic interventions, and thoracic nuclear medicine imaging is required but may be supervised by interventional radiology and nuclear medicine faculty.

Resident responsibilities:

1. The resident is involved in the daily conduct of chest radiology services. At the start of each working day, the resident will access the unread case list and will review all cases beginning with those marked "stat" or "emergent." The resident will also review the CT and MR schedules and will participate in the selection of the appropriate imaging protocol to be used based on the patient's clinical history. The resident will review the thoracic interventions schedule and will participate in these procedures after coordination with the chest radiology faculty to include review of requested procedures for appropriateness and approach. Absent clinical indications or seemingly inappropriate requests will be clarified and discussed with the referring physician. The chest radiology rotation at Saint Luke's Hospital begins immediately after morning conference at 0830 hours, and the afternoon rotation begins at 1330 hours. The resident will work in the department until the last case (all studies performed on or before 1700 hours) is final reported. The resident may be required to remain in the department to interpret (with the help of the responsible faculty member) emergent cases performed after 1700 hours in some instances.
2. The resident assigned to chest radiology is expected to be available for consultation by imaging technologists, clinicians and other health care professionals during regular office hours except during conference times, when attending faculty will provide coverage.
3. Imaging studies will be reviewed by the resident before the patient leaves the department if requested to do so by the supervising faculty.
4. Questions will be referred to the supervising faculty to which the resident is assigned.
5. Preliminary reports are dictated by the resident and always reviewed with the responsible attending faculty prior to finalization. Review of cases with the supervising faculty will be conducted as many times in the day as necessary to keep an efficient work flow. It is the resident's responsibility to bring "stat" or "emergent" cases to the attention of the supervising chest radiology faculty during the course of the day.
6. All imaging studies will be dictated by the end of each working day.
7. The resident will review and correct his/her reports prior to final verification by supervising faculty.

Faculty responsibilities:

1. The supervising faculty will be available at all times for any questions or consultations needed by the resident.
2. The supervising faculty will review all cases with the resident before the end of the day.
3. The supervising faculty will provide the resident with constructive feedback in any

- problem areas encountered during the rotation as well as through rotation evaluations.
4. The supervising faculty will sign resident-generated reports in a timely manner and inform the resident of any major changes he/she made.

Resident evaluation: Saint Luke's Hospital faculty use New Innovations software to complete electronic evaluations, which are based on the 6 ACGME core competencies. Residents are also evaluated by 1-2 technologists while on each month of the chest radiology rotation. See the resident handbook for further details.

CHEST RADIOLOGY - Rotation 1 – Goals

After completion of the first chest radiology rotation, the resident will be able to:

1. Accurately and concisely dictate bedside and ambulatory chest radiographic reports.
2. Communicate effectively and professionally with referring physicians, nurses, technologists and supervisory faculty.
3. Understand standard patient positioning for chest imaging studies.
4. Obtain pertinent patient information relative to interpretation of chest radiologic abnormalities using the electronic medical record or communication with the clinical team.
5. Demonstrate knowledge of the various indications for obtaining chest radiographs, chest CT and chest MR studies.
6. Demonstrate a responsible work ethic.
7. Demonstrate mastery of at least one fourth of the Knowledge-Based objectives (see Appendix)

CHEST RADIOLOGY - Rotation 1 – Objectives

I. Patient care:

- (a) All residents are required to complete an on line Patient Care, Radiation Safety module at least biannually.
- (b) The resident will document and gain knowledge of indications for the imaging studies requested. When the indication for the examination is not clear, the resident will effectively communicate with the patient or referring physician until the indication for the study or procedure is clarified.
- (c) The resident will become familiar with available medical records and how to access them for purposes of patient care.
- (d) The resident will review all studies with the supervising faculty.
- (e) Preliminary reports will be made available to all referring clinicians if needed prior to final review of cases. All significant and unexpected findings will be communicated to the referring physician (or the patient's nurse when appropriate) with documentation of who was contacted and the date and time of the communication on the dictated report. If there is a significant discrepancy between the preliminary and final interpretations, the resident will immediately notify the referring clinician.

II. Medical Knowledge:

At the end of the rotation, the resident will demonstrate learning of at least one fourth of the Society of Thoracic Radiology Knowledge Based Objectives for thoracic radiology (see Appendix). Because of the complexity of the subspecialty, the required knowledge will be reviewed on a weekly basis during the four weeks of the rotation. In the event that a rotation in chest radiology lasts over four weeks, the resident will use the remaining time to address those areas in which he/she feels that more study is required. The resident will refer to the Society of Thoracic Radiology Knowledge Based Objectives for thoracic radiology to develop a learning plan which will be discussed and updated in

collaboration with the attending radiologist on the first day of each week of the rotation.

At the end of rotation #1 the resident will be able to:

WEEK 1 - Emphasis on basic radiology and normal anatomy

- (a) define the four radiographic densities.
- (b) discuss the basics of standard and special radiographic projections and radiographic technique.
- (c) evaluate chest radiographs for image quality and correctly identify poor positioning and errors in radiographic technique. The resident will gain sufficient understanding to allow direct interaction with the radiologic technologist to correct and prevent technical errors.
- (d) discuss the basics of chest CT and list and describe protocols for conventional unenhanced and enhanced chest CT.
- (e) identify normal radiographic anatomy with special attention to the lines, stripes and interfaces of the chest.
- (f) identify normal CT anatomy, common normal variants and anatomic relationships.

WEEK 2 - Emphasis on signs of chest radiology and imaging manifestations of atelectasis

- (a) list and describe the different types of atelectasis.
- (b) identify and describe the radiographic and CT findings of atelectasis.
- (c) list, describe and identify basic signs of chest radiography and CT imaging and demonstrate knowledge of the significance of these findings.
- (d) list and describe the radiographic and CT findings of pleural effusion.
- (e) identify and describe the imaging characteristics of pulmonary consolidations and other forms of airspace disease and discuss the significance of these findings.

WEEK 3 - Emphasis on the pulmonary vasculature

- (a) identify, list and describe the radiographic and CT findings of interstitial edema and heart failure.
- (b) identify and assess common monitoring and life support devices seen on bedside radiography.
- (c) list and describe critical findings on bedside and ambulatory radiography including malpositioned support devices and pneumothorax.
- (d) describe the CT evaluation of suspected pulmonary thromboembolic disease.
- (e) develop and demonstrate a comprehensive approach for the evaluation of chest radiographs.

WEEK 4 - Emphasis on thoracic trauma

- (a) list and describe the different types of pneumothorax.
- (b) identify and describe the radiographic findings of pneumothorax.
- (c) identify and describe the radiographic findings of traumatic aortic injury, the CT protocol used for the evaluation of these patients and the CT features of this lesion.
- (d) describe the mechanism of pulmonary contusion and describe typical acute, subacute and chronic imaging findings.
- (e) discuss the significance of consolidations and atelectasis in adults.

III. Practice Based Learning and Improvement:

- (a) All residents are required to complete an on line Fluoroscopic Procedures and Radiation Safety module at least biannually.
- (b) The resident will demonstrate evidence of independent reading and learning through the use of printed and electronic sources. The resident will discuss with the chest radiology faculty his/her learning plan for the rotation outlining an approach for accumulating the fund of knowledge and gaining the technical skills required for the rotation.
 - (i) The resident will identify key textbook chapters and formulate a plan for reading them over the course of the rotation.
 - (ii) The resident will present at least two internet-based learning resources or tools that

contain information pertinent to the rotation and a plan for completing a review of the material during the course of the rotation.

- (iii) The resident will identify and provide a classic radiology article that addresses four of the entities listed in the required medical knowledge for the rotation.
- (c) The resident will follow-up abnormal or interesting cases through communication with the referring physician and/or patient medical records. The resident will use these cases to prepare two short didactic sessions to be delivered during the rotation during formal radiology chest conferences.
- (d) The resident will assist with review, preparation and presentation of cases for pulmonary conferences at least twice during the rotation.
- (e) The resident will demonstrate competence in using the PACS and PowerScribe systems in the accomplishment of the daily work and instruct others in their use.
- (f) The resident will document the performance, interpretation and complications of all procedures performed. Missed cases will be discussed during a special conference with emphasis on prevention of future interpretation errors.

IV. Interpersonal Communication Skills:

- (a) The resident will demonstrate effective communication of imaging findings to referring clinicians. The resident will promptly communicate all critical results to the clinical team.
- (b) The resident will demonstrate effective communication of abnormal imaging findings through clear, accurate and succinct reports.
- (c) The resident will study and present a summary of the ACR standards for communication of critical imaging findings.

V. Professionalism:

- (a) All residents are required to complete an on line professionalism module at least biannually.
- (b) The resident will recognize his/her limitations in personal knowledge and skills, being careful to not make decisions beyond the level of personal competence.
- (c) The resident will be able to communicate the nature of an imaging study and the imaging findings to patients and their families when needed.
- (d) The resident will observe ethical principles when recommending further evaluation.
- (e) The resident will be expected to be punctual and available.
- (f) The resident will dress professionally at work (according to the dress code of the department of radiology), wearing a name badge at all times.
- (g) The resident will always treat radiology technologists, support staff and other health workers with respect.
- (h) The resident will observe patient confidentiality at all times.
- (i) The resident will demonstrate knowledge of his/her ability to decide when it is appropriate to obtain immediate help from supervisory faculty when communicating with referring physicians.

VI. System Based Practice:

- (a) The resident will demonstrate familiarity with departmental procedures necessary in the performance of chest imaging studies.
- (b) The resident will use appropriate language when communicating with clinicians through reports or consultations so appropriate management decisions can be made.
- (c) The resident will provide accurate reports that list indications, technique, findings and conclusions as well as management or further imaging recommendations when appropriate.
- (d) The resident will dictate and correct his/her reports in a timely fashion to avoid delay in patient disposition.
- (e) The resident will assist in facilitating the performance of imaging studies whenever possible.
- (f) The resident will be aware the role that nuclear medicine plays in patient management and will make appropriate recommendations when needed.

- (g) The resident is encouraged to make suggestions to improve methods and systems used in the radiology department whenever appropriate.
- (h) The resident will participate in discussion with faculty members regarding operational challenges and potential systems solutions regarding all aspects of radiologic service and patient care.

Reading list:

Focus on basic radiology, imaging anatomy, signs in chest radiology, volume loss, pulmonary vasculature and trauma.

Focus on critical findings on radiography and CT

1. Federle M, Rosado-de-Christenson ML, Woodward PJ, et al. Diagnostic and Surgical Imaging Anatomy-Chest. Amirsys. 2007 – Chest anatomy
2. Webb WR, Higgins C. Thoracic Imaging. Pulmonary and Cardiovascular Radiology – Normal anatomy and Normal mediastinum, pulmonary thromboembolic disease.
3. Parker MS, Rosado-de-Christenson ML, Abbott GF. Teaching Atlas of Chest Imaging. Thieme. 2005. – Normal anatomy, Trauma
4. Complete three weekly chest Case in Point unknown cases: www.acr.org Discuss these cases with the faculty.
5. Complete Section 1 of ACR Chest Learning File

CHEST RADIOLOGY - Rotation 2

General overview:

Radiology resident rotations in chest radiology will include at least 4 months during the residency program. These rotations will take place at Saint Luke's Hospital of Kansas City and at Truman Medical Center. Completion of specific goals and objectives is required for every level of training with graded supervision by the attending faculty. All aspects of chest radiology will be incorporated into the residency, including the performance and interpretation of radiography, computed tomography and magnetic resonance imaging. In addition, training on thoracic interventions, and thoracic nuclear medicine imaging is required but may be supervised by interventional radiology and nuclear medicine faculty.

Resident responsibilities:

1. The resident is involved in the daily conduct of chest radiology services. At the start of each working day, the resident will access the unread case list and will review all cases beginning with those marked "stat" or "emergent." The resident will also review the CT and MR schedules and will participate in the selection of the appropriate imaging protocol to be used based on the patient's clinical history. The resident will review the thoracic interventions schedule and will participate in these procedures after coordination with the chest radiology faculty to include review of requested procedures for appropriateness and approach. Absent clinical indications or seemingly inappropriate requests will be clarified and discussed with the referring physician. The chest radiology rotation at Saint Luke's Hospital begins immediately after morning conference at 0830 hours, and the afternoon rotation begins at 1330 hours. The resident will work in the department until the last case (all studies performed on or before 1700 hours) is final reported. The resident may be required to remain in the department to interpret (with the help of the responsible faculty member) emergent cases performed after 1700 hours in some instances.
2. The resident assigned to chest radiology is expected to be available for consultation by imaging technologists, clinicians and other health care professionals during regular office hours except during conference times, when attending faculty will provide coverage.

3. Imaging studies will be reviewed by the resident before the patient leaves the department if requested to do so by the supervising faculty.
4. Questions will be referred to the supervising faculty to which the resident is assigned.
5. Preliminary reports are dictated by the resident and always reviewed with the responsible attending faculty prior to finalization. Review of cases with the supervising faculty will be conducted as many times in the day as necessary to keep an efficient work flow. It is the resident's responsibility to bring "stat" or "emergent" cases to the attention of the supervising chest radiology faculty during the course of the day.
6. All imaging studies will be dictated by the end of each working day.
7. The resident will review and correct his/her reports prior to final verification by supervising faculty.

Faculty responsibilities:

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

Resident evaluation: Saint Luke's Hospital faculty use New Innovations software to complete electronic evaluations, which are based on the 6 ACGME core competencies. Residents are also evaluated by 1-2 technologists while on each month of the chest radiology rotation. See the resident handbook for further details.

CHEST RADIOLOGY - Rotation 2 – Goals

After completion of the 2nd chest radiology rotation the resident will be able to:

1. Accurately and concisely dictate bedside and ambulatory chest radiographic reports.
2. Communicate effectively and professionally with referring physicians, nurses, technologists and supervisory faculty.
3. Understand standard patient positioning for chest imaging studies.
4. Obtain pertinent patient information relative to interpretation of chest radiologic abnormalities using the electronic medical record or communication with the clinical team.
5. Demonstrate knowledge of the various indications for obtaining chest radiographs, chest CT and chest MR studies.
6. Demonstrate a responsible work ethic.

In addition to the above listed goals for rotation 1, the resident will be able to:

1. Demonstrate mastery of at least one half of the Knowledge-Based objectives (see Appendix)
 2. Continue to build on chest radiography interpretive skills
 3. Develop skills in CT protocol selection and monitoring of chest CT studies.
 4. Demonstrate a comprehensive approach to the assessment and interpretation of chest CT studies.
 5. Demonstrate an understanding of the ACR Appropriateness Criteria and ACR Practice Standards and Technical Guidelines for chest radiology
 6. Demonstrate the ability to generate and interpret multiplanar reformatted (MPR) or three-dimensional images of CT or MRI studies as appropriate.
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CHEST RADIOLOGY - Rotation 2 – Objectives

I. Patient care:

- (a) All residents are required to complete an on line Patient Care, Radiation Safety module at least biannually.
- (b) The resident will document and gain knowledge of indications for the imaging studies requested. When the indication for the examination is not clear, the resident should effectively communicate with the patient or referring physician until the indication for the study is clarified.
- (c) The resident will be familiar with available medical records and how to access them for purposes of patient care.
- (d) The resident will review all imaging studies with the supervising faculty.
- (e) Preliminary reports will be made available to all referring clinicians if needed prior to final review of cases. If there is a significant discrepancy between the preliminary reading and the final reading, the resident will immediately notify the referring clinician.

In addition to the objectives listed for rotation 1 (see a through e), the resident will demonstrate the following patient care skills:

- (f) The resident will demonstrate the ability to select appropriate protocols for all requested chest CT studies to include the use of thin-section images, high-resolution images, expiratory images and prone images when appropriate. In addition, the resident will demonstrate an understanding of the appropriate use of intravenous contrast based on the patient's history.
- (g) The resident will demonstrate the ability to manage an intravenous contrast reaction.
- (h) The resident will describe the principles of chest fluoroscopy, including the assessment of the diaphragm.
- (i) The resident will demonstrate knowledge of CT parameters contributing to patient radiation exposure and techniques that can be used to limit radiation dose.

II. Medical Knowledge:

At the end of the rotation, the resident will demonstrate learning of at least one half of the Society of Thoracic Radiology Knowledge Based Objectives for thoracic radiology (see Appendix). Because of the complexity of the subspecialty, the required knowledge will be reviewed on a weekly basis during the four weeks of the rotation. In the event that a rotation in chest radiology lasts over four weeks, the resident will use the remaining time to address those areas in which he/she feels that more study is required. The resident will refer to the Society of Thoracic Radiology Knowledge Based Objectives for thoracic radiology to develop a learning plan which will be discussed and updated in collaboration with the attending radiologist on the first day of each week of the rotation.

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

WEEK 1 - Emphasis on pulmonary infections

- (a) Define the different types of pulmonary infections (bacterial, mycobacterial, viral, fungal and parasitic) and their imaging manifestations.
- (b) Describe the imaging manifestations of pulmonary infections in immune compromised patients.
- (c) Describe the significance of recurrent pulmonary infection in the same anatomic location.
- (d) Demonstrate an understanding of the CT manifestations of infectious bronchiolitis.

WEEK 2 - Emphasis on the solitary pulmonary nodule

- (a) Define solitary pulmonary nodule.
- (b) List, describe and identify the different types of pulmonary nodules based on patterns of attenuation and their significance
- (c) Provide a comprehensive differential diagnosis for the solitary pulmonary nodule.

- (d) Demonstrate an understanding of benign and indeterminate patterns of calcification within a pulmonary nodule.
- (e) List the imaging characteristics of benign and malignant pulmonary nodules.
- (f) Demonstrate knowledge and understanding of the Fleischner recommendations for the management of small pulmonary nodules in adults.
- (g) Describe the use of PET CT imaging in the evaluation of solitary pulmonary nodules.

WEEK 3 - Emphasis on pulmonary neoplasms

- (a) List and describe the radiographic signs of pulmonary malignancy.
- (b) List and describe the radiographic and CT characteristics of malignant pulmonary masses.
- (c) Discuss the CT evaluation of patients with primary malignant pulmonary neoplasms, the CT staging of these lesions and the typical findings of early stage and operable pulmonary malignancy.
- (d) List the features of advanced, inoperable pulmonary malignancies.
- (e) Describe the use of PET-CT imaging in the assessment of patients with malignancy
- (f) Discuss the evaluation of patients with secondary neoplasm and describe the classic imaging features of these malignancies
- (g) List the CT features of benign pulmonary neoplasms

WEEK 4 - Emphasis on diseases of the pleura and chest wall

- (a) List and describe the imaging findings of benign pleural disease including pneumothorax, pleural effusion and benign pleural thickening
- (b) List and describe the imaging findings of pleural infections with emphasis on empyema
- (c) List the imaging features of malignant pleural effusion and malignant pleural thickening and provide a comprehensive differential diagnosis for these abnormalities
- (d) Describe the significance of asbestos related pleural disease.

III. Practice Based Learning and Improvement:

- (a) All residents are required to complete an on line Fluoroscopic Procedures and Radiation Safety module at least biannually.
- (b) The resident will demonstrate evidence of independent reading and learning through the use of printed and electronic sources. The resident will discuss with attending chest radiology faculty his/her individual learning plan for the rotation outlining an approach for accumulating the fund of knowledge and gaining technical skills required for the rotation.
 - (i) The resident will identify key textbook chapters and formulate a plan for reading them over the course of the rotation.
 - (ii) The resident will present at least two internet-based learning resources or tools that contain information pertinent to the rotation and a plan for completing a review of the material during the course of the rotation.
 - (iii) The resident will identify and provide a classic radiology article that addresses four of the entities listed in the required medical knowledge for the rotation.
- (c) The resident will follow-up abnormal or interesting cases through communication with the referring physician and/or patient medical records. The resident will use these cases to prepare two short didactic sessions to be delivered twice during the rotation during formal radiology chest conferences.
- (d) The resident will assist with review, preparation and presentation of cases for pulmonary conferences at least twice during the rotation.
- (e) The resident will demonstrate competence in using the PACS and PowerScribe systems in the accomplishment of the daily work and instruct others in their use.
- (f) The resident will document the performance, interpretation and complications of all procedures performed. Missed cases will be discussed during a special conference with emphasis on prevention of future interpretation errors.

In addition to the objectives listed for rotation 1 (see a through f), the resident will demonstrate the following practice based learning and improvement skills:

- (g) The resident will demonstrate the ability to effectively present thoracic radiology cases to other residents in a conference setting and will demonstrate knowledge of appropriate case selection, interaction with residents and students and presentation of a brief discussion of the imaging findings, differential diagnosis and diagnosis for each case.
- (h) The resident will demonstrate the ability to supervise the learning of junior residents and medical students.

IV. Interpersonal Communication Skills:

- (a) The resident will demonstrate effective communication of imaging findings to referring clinicians. The resident will promptly communicate all critical results to the clinical team.
- (b) The resident will demonstrate effective communication of abnormal imaging findings through clear, succinct and accurate reports.
- (c) The resident will study and present a summary of the ACR standards for communication of critical imaging findings.

In addition to the objectives listed for rotation 1 (see a through c), the resident will demonstrate the following interpersonal communication skills:

- (d) The resident will demonstrate the ability to act as a consultant for referring clinicians and the ability to recommend the appropriate use of imaging studies.

V. Professionalism:

- (a) All residents are required to complete an on line professionalism module at least biannually.
- (b) The resident will recognize his/her limitations in personal knowledge and skills, being careful to not make decisions beyond the level of personal competence.
- (c) The resident will be able to communicate the nature of an imaging study and the imaging findings to patients and their families when needed.
- (d) The resident will observe ethical principles when recommending further evaluation.
- (e) The resident will be expected to be punctual and available.
- (f) The resident will dress professionally at work (according to the dress code of the department of radiology), wearing a name badge at all times.
- (g) The resident will always treat radiology technologists, support staff and other health workers with respect.
- (h) The resident will observe patient confidentiality at all times.
- (i) The resident will demonstrate knowledge of his/her ability to decide when it is appropriate to obtain immediate help from supervisory faculty when communicating with referring physicians.

VI. System Based Practice:

- (a) The resident will demonstrate familiarity with departmental procedures necessary in the performance of chest imaging studies.
- (b) The resident will use appropriate language when communicating with clinicians through reports or consultations so appropriate management decisions can be made.
- (c) The resident will provide accurate reports that list indications, technique, findings and conclusions as well as management or further imaging recommendations when appropriate.
- (d) The resident will dictate and correct his/her reports in a timely fashion to avoid delay in patient disposition.
- (e) The resident will assist in facilitating the performance of the imaging studies whenever possible.
- (f) The resident will be aware the role that nuclear medicine plays in patient management and will make appropriate recommendations when needed.
- (g) The resident is encouraged to make suggestions to improve methods and systems used in the radiology department whenever appropriate.

- (h) The resident will participate in discussion with faculty members regarding operational challenges and potential systems solutions regarding all aspects of radiologic service and patient care.

In addition to the objectives listed for rotation 1 (see a through h), the resident will demonstrate the following system based practice skills:

- (i) The resident will demonstrate the ability to act as a consultant for referring clinicians and the ability to recommend the appropriate use of imaging studies.
- (j) The resident will demonstrate the ability to accurately interpret an increasing number of imaging studies of increasing complexity during the course of the residency. The attending radiologist will provide feedback regarding the attainment of appropriate volumes for the rotation and will work closely with the resident in honing these skills.

Reading list:

Focus on pulmonary infections, solitary pulmonary nodule assessment, benign and malignant neoplasms, and diseases of the pleura and chest wall.

1. Webb WR, Higgins C. Thoracic Imaging. Pulmonary and Cardiovascular Radiology. – Pulmonary infections, Lung cancer, Metastatic disease, Lymphoma
2. Parker MS, Rosado-de-Christenson ML, Abbott GF. Teaching Atlas of Chest Imaging. Thieme. 2005. – Pulmonary infections, Lung cancer, Diseases of the pleura and chest wall.
3. Complete three weekly chest Case in Point unknown cases: www.acr.org Discuss these cases with the faculty.
4. Complete Sections 2, 3, 4, and 5 of ACR Chest Learning File
5. Selected articles from the current literature as assigned by faculty.

CHEST RADIOLOGY - Rotation 3

General overview:

Radiology resident rotations in chest radiology will include at least 4 months during the residency program. These rotations will take place at Saint Luke's Hospital of Kansas City and at Truman Medical Center. Completion of specific goals and objectives is required for every level of training with graded supervision by the attending faculty. All aspects of chest radiology will be incorporated into the residency, including the performance and interpretation of radiography, computed tomography and magnetic resonance imaging. In addition, training on thoracic interventions, and thoracic nuclear medicine imaging is required but may be supervised by interventional radiology and nuclear medicine faculty.

Resident responsibilities:

1. The resident is involved in the daily conduct of chest radiology services. At the start of each working day, the resident will access the unread case list and will review all cases beginning with those marked "stat" or "emergent." The resident will also review the CT and MR schedules and will participate in the selection of the appropriate imaging protocol to be used based on the patient's clinical history. The resident will review the thoracic interventions schedule and will participate in these procedures after coordination with the chest radiology faculty to include review of requested procedures for appropriateness and approach. Absent clinical indications or seemingly inappropriate requests will be clarified and discussed with the referring physician. The chest radiology rotation at Saint Luke's Hospital begins immediately after morning conference at 0830 hours, and the afternoon rotation begins at 1330 hours. The resident will work in the department until the last case (all studies performed on or before 1700 hours) is final reported. The resident may be required to remain in the department to interpret (with the help of the responsible faculty

- member) emergent cases performed after 1700 hours in some instances.
2. The resident assigned to chest radiology is expected to be available for consultation by imaging technologists, clinicians and other health care professionals during regular office hours except during conference times, when attending faculty will provide coverage.
 3. Imaging studies will be reviewed by the resident before the patient leaves the department if requested to do so by the supervising faculty.
 4. Questions will be referred to the supervising faculty to which the resident is assigned.
 5. Preliminary reports are dictated by the resident and always reviewed with the responsible attending faculty prior to finalization. Review of cases with the supervising faculty will be conducted as many times in the day as necessary to keep an efficient work flow. It is the resident's responsibility to bring "stat" or "emergent" cases to the attention of the supervising chest radiology faculty during the course of the day.
 6. All imaging studies will be dictated by the end of each working day.
 7. The resident will review and correct his/her reports prior to final verification by supervising faculty.

Faculty responsibilities:

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

Resident evaluation: Saint Luke's Hospital faculty use New Innovations software to complete electronic evaluations, which are based on the 6 ACGME core competencies. Residents are also evaluated by 1-2 technologists while on each month of the chest radiology rotation. See the resident handbook for further details.

CHEST RADIOLOGY - Rotation 3 – Goals

After completion of the third chest radiology rotation the resident will be able to:

1. Accurately and concisely dictate bedside and ambulatory chest radiographic reports.
2. Communicate effectively and professionally with referring physicians, nurses, technologists and supervisory faculty.
3. Understand standard patient positioning for chest imaging studies.
4. Obtain pertinent patient information relative to interpretation of chest radiologic abnormalities using the electronic medical record or communication with the clinical team.
5. Demonstrate knowledge of the various indications for obtaining chest radiographs, chest CT and chest MR studies.
6. Demonstrate a responsible work ethic.
7. continue to build on chest radiography interpretive skills
8. Develop skills in CT protocol selection and monitoring of chest CT studies.
9. Demonstrate a comprehensive approach to the assessment and interpretation of chest CT studies.
10. Demonstrate an understanding of the ACR Appropriateness Criteria and ACR Practice Standards and Technical Guidelines for chest radiology
11. Demonstrate the ability to generate and interpret multiplanar reformatted (MPR) or three-dimensional images of CT or MRI studies as appropriate.

In addition to the above listed goals for rotations 1 and 2, the resident will be able to:

12. Demonstrate mastery of at least three fourths of the Knowledge-Based objectives (see Appendix).

13. Become a more autonomous consultant and teacher.

CHEST RADIOLOGY - Rotation 3 – Objectives

I. Patient care:

- (a) All residents are required to complete an on line Patient Care, Radiation Safety module at least biannually.
- (b) The resident will document and gain knowledge of indications for the imaging studies requested. When the indication for the examination is not clear, the resident should effectively communicate with the patient or referring physician until the indication for the study is clarified.
- (c) The resident will be familiar with available medical records and how to access them for purposes of patient care.
- (d) The resident will review all imaging studies with the supervising faculty.
- (e) Preliminary reports will be made available to all referring clinicians if needed prior to final review of cases. If there is a significant discrepancy between the preliminary reading and the final reading, the resident will immediately notify the referring clinician.
- (f) The resident will demonstrate the ability to select appropriate protocols for all requested chest CT studies to include the use of thin-section images, high-resolution images, expiratory images and prone images when appropriate. In addition, the resident will demonstrate an understanding of the appropriate use of intravenous contrast based on the patient's history.
- (g) The resident will demonstrate the ability to manage an intravenous contrast reaction.
- (h) The resident will describe the principles of chest fluoroscopy, including the assessment of the diaphragm
- (i) The resident will demonstrate knowledge of CT parameters contributing to patient radiation exposure and techniques that can be used to limit radiation dose.

In addition to the objectives listed for rotations 2 and 3 (see a through i), the resident will demonstrate the following patient care skills:

- (j) The resident will demonstrate the ability to list and describe the clinical indications for performing chest CT and MRI.
- (k) The resident will demonstrate the ability to describe chest CT protocols optimized for evaluation of: thoracic aorta, suspected pulmonary embolism, tracheobronchial tree, bronchiectasis, lung cancer staging, suspected pulmonary metastases, suspected pulmonary nodule on radiography, dyspnea, and hemoptysis.
- (l) The resident will demonstrate an understanding of the technical principles of all chest MRI exams and describe a protocol optimized for evaluating the thoracic aorta, pulmonary arteries, and superior sulcus tumor.
- (g) The resident will demonstrate the ability to work in the reading room independently assisting clinicians with radiologic interpretation.

II. Medical Knowledge:

At the end of the rotation, the resident will demonstrate learning of at least three fourths of the Society of Thoracic Radiology Knowledge Based Objectives for thoracic radiology (see Appendix). Because of the complexity of the subspecialty, the required knowledge will be reviewed on a weekly basis during the four weeks of the rotation. In the event that a rotation in chest radiology lasts over four weeks, the resident will use the remaining time to address those areas in which he/she feels that more study is required. The resident will refer to the Society of Thoracic Radiology Knowledge Based Objectives for thoracic radiology to develop a learning plan which will be discussed and updated in collaboration with the attending radiologist on the first day of each week of the rotation.

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

WEEK 1 - Emphasis on airspace disease

- (a) correctly identify airspace disease based on radiographic characteristics.
- (b) provide a comprehensive differential diagnosis for airspace disease.
- (c) identify and describe the difference between ground glass opacity, consolidation and atelectasis.
- (d) discuss the imaging appearance of pulmonary hemorrhage, pulmonary infection and alveolar edema
- (e) describe the significance of ground glass opacity, crazy paving and the CT halo sign and provide a differential diagnosis for each of these entities.

WEEK 2 - Emphasis on interstitial lung disease

- (a) list the idiopathic interstitial pneumonias with emphasis on usual interstitial pneumonia and non-specific interstitial pneumonia.
- (b) identify the presence of honeycomb lung on radiography and CT and describe the significance of this finding.
- (c) identify, describe and characterize micronodules in CT and explain the difference between random, centrilobular and perilymphatic nodules and the significance of these findings.
- (d) demonstrate an understanding of diseases that exhibit perilymphatic distribution to include sarcoidosis, silicosis and lymphangitic carcinomatosis and describe the role of the radiologist in the diagnosis of these conditions.

WEEK 3 - Emphasis on diseases of the airways

- (a) list the various types of bronchiectasis.
- (b) identify and assess bronchiectasis on radiography and CT.
- (c) list a comprehensive differential diagnosis for bronchiectasis.
- (d) identify and assess tracheobronchomalacia
- (e) list and describe the various types of emphysema and their associated conditions.
- (f) provide a differential diagnosis for pulmonary hyperlucency on radiography.
- (g) describe the imaging features of small airways disease and provide a reasonable differential diagnosis.

WEEK 4 - Emphasis on congenital diseases

- (a) describe the imaging features of intralobar sequestrations and explain the etiology of these abnormalities.
- (b) identify and describe the imaging features of the pulmonary venolobar syndrome and list at least four of the components of this syndrome.
- (c) identify and describe normal vascular variants such as aberrant subclavian artery, right aortic arch, and persistent left superior vena cava.
- (d) identify and describe variant bronchial anatomy including tracheal bronchus and accessory cardiac bronchus.
- (e) identify the congenital cysts of the mediastinum with emphasis on their differentiation from cystic neoplasms.

III. Practice Based Learning and Improvement:

- (a) All residents are required to complete an on line Fluoroscopic Procedures and Radiation Safety module at least biannually.
- (b) The resident will demonstrate evidence of independent reading and learning through the use of printed and electronic sources. The resident will discuss with the chest radiology faculty his/her learning plan for the rotation outlining an approach for accumulating the fund of knowledge and gaining the technical skills required for the rotation.
 - (i) The resident will identify key textbook chapters and formulate a plan for reading them over the course of the rotation.
 - (ii) The resident will present at least two internet-based learning resources or tools that contain information pertinent to the rotation and a plan for completing a review of the material during the course of the rotation.

- (iii) The resident will identify and provide a classic radiology article that addresses four of the entities listed in the required medical knowledge for the rotation.
- (c) The resident will follow-up abnormal or interesting cases through communication with the referring physician and/or patient medical records. The resident will use these cases to prepare two short didactic sessions to be delivered twice during the rotation during formal radiology chest conferences.
- (d) The resident will assist with review, preparation and presentation of cases for pulmonary conferences at least twice during the rotation.
- (e) The resident will demonstrate competence in using the PACS and PowerScribe systems in the accomplishment of the daily work and instruct others in their use.
- (f) The resident will document the performance, interpretation and complications of all procedures performed. Missed cases will be discussed during a special conference with emphasis on prevention of future interpretation errors.
- (g) The resident will demonstrate the ability to effectively present thoracic radiology cases to other residents in a conference setting and will demonstrate knowledge of appropriate case selection, interaction with residents and students and presentation of a brief discussion of the imaging findings, differential diagnosis and diagnosis for each case.
- (h) The resident will demonstrate the ability to supervise the learning of junior residents and medical students.

In addition to the objectives listed for rotations 1 and 2 (see a through h), the resident will demonstrate the following practice based learning and improvement skills:

- (i) In collaboration with a pathologist, the resident will present an interesting thoracic imaging case with a confirmed diagnosis correlating clinical history with pathologic and radiologic findings to residents and faculty.

IV. Interpersonal Communication Skills:

- (a) The resident will demonstrate effective communication of imaging findings to referring clinicians. The resident will promptly communicate all critical results to the clinical team.
- (b) The resident will demonstrate effective communication of abnormal imaging findings through clear, succinct and accurate reports.
- (c) The resident will study and present a summary of the ACR standards for communication of critical imaging findings.
- (d) The resident will demonstrate the ability to act as a consultant for referring clinicians and the ability to recommend the appropriate use of imaging studies.

In addition to the objectives listed for rotations 1 and 2 (see a through d), the resident will demonstrate the following interpersonal communication skills:

- (e) The resident will demonstrate the ability to work in the reading room independently assisting clinicians with radiologic interpretation and teaching other residents and medical students.

V. Professionalism:

- (a) All residents are required to complete an on line professionalism module at least biannually.
- (b) The resident will recognize his/her limitations in personal knowledge and skills, being careful to not make decisions beyond the level of personal competence.
- (c) The resident will be able to communicate the nature of an imaging study and the imaging findings to patients and their families when needed.
- (d) The resident will observe ethical principles when recommending further evaluation.
- (e) The resident will be expected to be punctual and available.
- (f) The resident will dress professionally at work (according to the dress code of the department of radiology), wearing a name badge at all times.
- (g) The resident will always treat radiology technologists, support staff and other health

- workers with respect.
- (h) The resident will observe patient confidentiality at all times.
 - (j) The resident will demonstrate knowledge of his/her ability to decide when it is appropriate to obtain immediate help from supervisory faculty when communicating with referring physicians.

VI. System Based Practice:

- (a) The resident will demonstrate familiarity with departmental procedures necessary in the performance of chest imaging studies.
- (b) The resident will use appropriate language when communicating with clinicians through reports or consultations so appropriate management decisions can be made.
- (c) The resident will provide accurate reports that list indications, technique, findings and conclusions as well as management and further imaging recommendations when appropriate.
- (d) The resident will dictate and correct his/her reports in a timely fashion to avoid delay in patient disposition.
- (e) The resident will assist in facilitating the performance of imaging studies whenever possible.
- (f) The resident will be aware the role that nuclear medicine plays in patient management and will make appropriate recommendations when needed.
- (g) The resident is encouraged to make suggestions to improve methods and systems used in the radiology department whenever appropriate.
- (h) The resident will participate in discussion with faculty members regarding operational challenges and potential systems solutions regarding all aspects of radiologic service and patient care.
- (i) The resident will demonstrate the ability to act as a consultant for referring clinicians and the ability to recommend the appropriate use of imaging studies.
- (j) The resident will demonstrate the ability to accurately interpret an increasing number of imaging studies of increasing complexity during the course of the residency. The attending radiologist will provide feedback regarding the attainment of appropriate volumes for the rotation and will work closely with the resident in honing these skills.

Reading list: Focus on airspace disease, interstitial lung disease, airways and congenital lesions.

Emphasis on filling in gaps in knowledge and study by taking cases in an oral board format. Review material learned on previous rotations in chest radiology.

1. Webb WR, Higgins C. Thoracic Imaging. Pulmonary and Cardiovascular Radiology – Congenital lesions, Lymphoproliferative disorders, Diffuse interstitial lung disease.
2. Parker MS, Rosado-de-Christenson ML, Abbott GF. Teaching Atlas of Chest Imaging. Thieme. 2005. – Airways disease, Congenital disease, Idiopathic interstitial pneumonias
3. Complete five weekly chest Case in Point unknown cases: www.acr.org Discuss these cases with the faculty.
4. Complete Sections 6, 7, 8, 9 of ACR Chest Learning File

CHEST RADIOLOGY - Rotation 4

General overview:

Radiology resident rotations in chest radiology will include at least 4 months during the residency program. These rotations will take place at Saint Luke's Hospital of Kansas City and at Truman Medical Center. Completion of specific goals and objectives is required for every level of training with graded supervision by the attending faculty. All aspects of chest radiology will be incorporated into the residency, including the performance and interpretation of radiography, computed tomography and magnetic resonance imaging. In addition, training on thoracic interventions, and thoracic nuclear medicine imaging is required but may be supervised by

interventional radiology and nuclear medicine faculty.

Resident responsibilities:

1. The resident is involved in the daily conduct of chest radiology services. At the start of each working day, the resident will access the unread case list and will review all cases beginning with those marked "stat" or "emergent." The resident will also review the CT and MR schedules and will participate in the selection of the appropriate imaging protocol to be used based on the patient's clinical history. The resident will review the thoracic interventions schedule and will participate in these procedures after coordination with the chest radiology faculty to include review of requested procedures for appropriateness and approach. Absent clinical indications or seemingly inappropriate requests will be clarified and discussed with the referring physician. The chest radiology rotation at Saint Luke's Hospital begins immediately after morning conference at 0830 hours, and the afternoon rotation begins at 1330 hours. The resident will work in the department until the last case (all studies performed on or before 1700 hours) is final reported. The resident may be required to remain in the department to interpret (with the help of the responsible faculty member) emergent cases performed after 1700 hours in some instances.
2. The resident assigned to chest radiology is expected to be available for consultation by imaging technologists, clinicians and other health care professionals during regular office hours except during conference times, when attending faculty will provide coverage.
3. Imaging studies will be reviewed by the resident before the patient leaves the department if requested to do so by the supervising faculty.
4. Questions will be referred to the supervising faculty to which the resident is assigned.
5. Preliminary reports are dictated by the resident and always reviewed with the responsible attending faculty prior to finalization. Review of cases with the supervising faculty will be conducted as many times in the day as necessary to keep an efficient work flow. It is the resident's responsibility to bring "stat" or "emergent" cases to the attention of the supervising chest radiology faculty during the course of the day.
6. All imaging studies will be dictated by the end of each working day.
7. The resident will review and correct his/her reports prior to final verification by supervising faculty.

Faculty Responsibilities:

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

Resident evaluation: Saint Luke's Hospital faculty use New Innovations software to complete electronic evaluations, which are based on the 6 ACGME core competencies. Residents are also evaluated by 1-2 technologists while on each month of the chest radiology rotation. See the resident handbook for further details.

CHEST RADIOLOGY - Rotation 4 – Goals

After completion of the fourth chest radiology rotation the resident will be able to:

1. accurately and concisely dictate bedside and ambulatory chest radiographic reports.
2. communicate effectively and professionally with referring physicians, nurses, technologists and supervisory faculty.
3. understand standard patient positioning for chest imaging studies.
4. obtain pertinent patient information relative to interpretation of chest radiologic

- abnormalities using the electronic medical record or communication with the clinical team.
5. demonstrate knowledge of the various indications for obtaining chest radiographs, chest CT and chest MR studies.
 6. demonstrate a responsible work ethic.
 7. continue to build on chest radiography interpretive skills
 8. develop skills in CT protocol selection and monitoring of chest CT studies.
 9. demonstrate a comprehensive approach to the assessment and interpretation of chest CT studies.
 10. demonstrate an understanding of the ACR Appropriateness Criteria and ACR Practice Standards and Technical Guidelines for chest radiology
 11. demonstrate the ability to generate and interpret multiplanar reformatted (MPR) or three-dimensional images of CT or MRI studies as appropriate.
 12. demonstrate the ability to function as a nearly autonomous consultant and teacher.

In addition to the above listed goals for rotations 1, 2, and 3 the resident will be able to:

13. demonstrate mastery of all the of the Knowledge-Based objectives (see Appendix).
14. demonstrate good interpretive skills in chest radiography and chest CT.
15. understand the use of magnetic resonance imaging as a problem solving tool in chest radiology.
16. demonstrate good interpretive skills in PET-CT imaging of the chest.
17. demonstrate the ability to accurately interpret an increasing number of imaging studies similar to those interpreted by the faculty.
18. engage in introspection and self -assessment to identify areas that require further study.

CHEST RADIOLOGY - Rotation 4 – Objectives

I. Patient care:

All residents are required to complete an on line Patient Care, Radiation Safety module at least biannually.

- (a) The resident will document and gain knowledge of indications for the imaging studies requested. When the indication for the examination is not clear, the resident should effectively communicate with the patient or referring physician until the indication for the study is clarified.
- (b) The resident will be familiar with available medical records and how to access them for purposes of patient care.
- (c) The resident will review all imaging studies with the supervising faculty.
- (d) Preliminary reports will be made available to all referring clinicians if needed prior to final review of cases. If there is a significant discrepancy between the preliminary reading and the final reading, the resident will immediately notify the referring clinician.
- (e) The resident will demonstrate the ability to select appropriate protocols for all requested chest CT studies to include the use of thin-section images, high-resolution images, expiratory images and prone images when appropriate. In addition, the resident will demonstrate an understanding of the appropriate use of intravenous contrast based on the patient's history.
- (f) The resident will demonstrate the ability to manage an intravenous contrast reaction.
- (g) The resident will describe the principles of chest fluoroscopy, including the assessment of the diaphragm
- (h) The resident will demonstrate knowledge of CT parameters contributing to patient radiation exposure and techniques that can be used to limit radiation dose.
- (i) The resident will be able to state the clinical indications for performing chest CT and MRI.
- (j) The resident will demonstrate the ability to list and describe chest CT protocols optimized for evaluation of: thoracic aorta, suspected pulmonary embolism, tracheobronchial tree, bronchiectasis, lung cancer staging, suspected pulmonary metastases, suspected

- pulmonary nodule on radiography, dyspnea, and hemoptysis.
- (k) The resident will demonstrate an understanding of the technical principles of all chest MRI exams and describe a protocol optimized for evaluating the thoracic aorta, pulmonary arteries, and superior sulcus tumor.
 - (l) The resident will demonstrate the ability to work in the reading room independently assisting clinicians with radiologic interpretation.

II. Medical Knowledge:

At the end of the rotation, the resident will demonstrate learning of all the Society of Thoracic Radiology Knowledge Based Objectives for thoracic radiology (see Appendix). Because of the complexity of the subspecialty, the required knowledge will be reviewed on a weekly basis during the four weeks of the rotation. In the event that a rotation in chest radiology lasts over four weeks, the resident will use the remaining time to address those areas in which he/she feels that more study is required. The resident will refer to the Society of Thoracic Radiology Knowledge Based Objectives for thoracic radiology to develop a learning plan which will be discussed and updated in collaboration with the attending radiologist on the first day of each week of the rotation.

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

WEEK 1 - Emphasis on mediastinal masses

- (a) list and describe the radiologic mediastinal compartments according to Felson and Fraser and Pare.
- (b) list and describe the anatomic and surgical mediastinal compartments.
- (c) list and describe primary and secondary mediastinal neoplasms and non neoplastic conditions that may manifest as masses.
- (d) list and describe vascular lesions that may mimic mediastinal masses.
- (e) demonstrate an understanding of the management of different mediastinal masses.

WEEK 2 – Emphasis on cardiovascular imaging as performed with conventional chest CT and MR

- (a) list and describe the various imaging manifestations of acquired and congenital diseases of the aorta
- (b) list and describe the appearance of the normal pericardium and pericardial abnormalities.

WEEK 3 - Emphasis on review of knowledge gaps and preparation of a plan for life long learning

WEEK 4 - Emphasis on review of knowledge gaps and preparation of a plan for life long learning

Practice Based Learning and Improvement:

- (a) All residents are required to complete an on line Fluoroscopic Procedures and Radiation Safety module at least biannually.
- (b) The resident will demonstrate evidence of independent reading and learning through the use of printed and electronic sources. The resident will discuss with the chest radiology faculty his/her learning plan for the rotation outlining an approach for accumulating the fund of knowledge and gaining the technical skills required for the rotation.
 - (i) The resident will identify key textbook chapters and formulate a plan for reading them over the course of the rotation.
 - (ii) The resident will present at least two internet-based learning resources or tools that contain information pertinent to the rotation and a plan for completing a review of the material during the course of the rotation.
 - (iii) The resident will identify and provide a classic radiology article that addresses four of the entities listed in the required medical knowledge for the rotation.
- (c) The resident will follow-up abnormal or interesting cases through communication with the

referring physician and/or patient medical records. The resident will use these cases to prepare two short didactic sessions to be delivered twice during the rotation during formal radiology chest conferences.

- (d) The resident will assist with review, preparation and presentation of cases for pulmonary conferences at least twice during the rotation.
- (e) The resident will demonstrate competence in using the PACS and PowerScribe systems in the accomplishment of the daily work and instruct others in their use.
- (f) The resident will document the performance, interpretation and complications of all procedures performed. Missed cases will be discussed during a special conference with emphasis on prevention of future interpretation errors.
- (g) The resident will demonstrate the ability to effectively present thoracic radiology cases to other residents in a conference setting and will demonstrate knowledge of appropriate case selection, interaction with residents and students and presentation of a brief discussion of the imaging findings, differential diagnosis and diagnosis for each case.
- (h) The resident will demonstrate the ability to supervise the learning of junior residents and medical students.
- (i) In collaboration with a pathologist, the resident will present an interesting thoracic imaging case with a confirmed diagnosis correlating clinical history with pathologic and radiologic findings to residents and faculty.

IV. Interpersonal Communication Skills:

- (a) The resident will demonstrate effective communication of imaging findings to referring clinicians. The resident will promptly communicate all critical results to the clinical team.
- (b) The resident will demonstrate effective communication of abnormal imaging findings through clear, succinct and accurate reports.
- (c) The resident will study and present a summary of the ACR standards for communication of critical imaging findings.
- (d) The resident will demonstrate the ability to act as a consultant for referring clinicians and the ability to recommend the appropriate use of imaging studies.
- (e) The resident will demonstrate the ability to work in the reading room independently assisting clinicians with radiologic interpretation and teaching other residents and medical students.

V. Professionalism:

- (a) All residents are required to complete an on line professionalism module at least biannually.
- (b) The resident will recognize his/her limitations in personal knowledge and skills, being careful to not make decisions beyond the level of personal competence.
- (c) The resident will be able to communicate the nature of an imaging study and the imaging findings to patients and their families when needed.
- (d) The resident will observe ethical principles when recommending further evaluation.
- (e) The resident will be expected to be punctual and available.
- (f) The resident will dress professionally at work (according to the dress code of the department of radiology), wearing a name badge at all times.
- (g) The resident will always treat radiology technologists, support staff and other health workers with respect.
- (h) The resident will observe patient confidentiality at all times.
- (j) The resident will demonstrate knowledge of his/her ability to decide when it is appropriate to obtain immediate help from supervisory faculty when communicating with referring physicians.

VI. System Based Practice:

- (a) The resident will demonstrate familiarity with departmental procedures necessary in the performance of chest imaging studies.
- (b) The resident will use appropriate language when communicating with clinicians through reports or consultations so appropriate management decisions can be made.

- (c) The resident will provide accurate reports that list indications, technique, findings and conclusions as well as management or further imaging recommendations when appropriate.
- (d) The resident will dictate and correct his/her reports in a timely fashion to avoid delay in patient disposition.
- (e) The resident will assist in facilitating the performance of imaging studies whenever possible.
- (f) The resident will be aware the role that nuclear medicine plays in patient management and will make appropriate recommendations when needed.
- (g) The resident is encouraged to make suggestions to improve methods and systems used in the radiology department whenever appropriate.
- (h) The resident will participate in discussion with faculty members regarding operational challenges and potential systems solutions regarding all aspects of radiologic service and patient care.
- (i) The resident will demonstrate the ability to act as a consultant for referring clinicians and the ability to recommend the appropriate use of imaging studies.
- (j) The resident will demonstrate the ability to accurately interpret an increasing number of imaging studies of increasing complexity during the course of the residency. The attending radiologist will provide feedback regarding the attainment of appropriate volumes for the rotation and will work closely with the resident in honing these skills.

Reading list: Focus on mediastinal masses. Reading list for the rotation to be determined by the resident and discussed with the attending. This will allow the resident to begin formulating a plan for life-long learning to be used during the last year of residency, fellowship and beyond. The goal is to address all areas where there may be knowledge gaps.

*Emphasis on filling in gaps in knowledge and study by taking cases in an oral board format.
Review material learned on previous rotations in chest radiology.*

1. Collins J, Abbott GF, Holbert JM, et al. Revised curriculum on cardiothoracic radiology for diagnostic radiology residency with goals and objectives related to general competencies. *Acad Radiol* 2005; 12: 210-223.