# **GOALS/EXPECTATIONS FOR RESIDENTS ON CHEST ROTATION**

# Workday:

- 8:00 AM to 5:00 PM or until the work is finished
- Meeting Attendance 12:15 to 2:00 PM is allocated conference time
- Most mornings, one faculty member on service will hold a case-based teaching conference (usually at 8 or 9 am)

# **Daily Workflow**

- Work as a colleague with assigned radiologist.
- All attempts will be made to review cases with the attending prior to going to conference. It is up to the resident to notify their attending radiologist immediately about any emergency cases or questionable cases.
- Please help us answering the phones and triaging questions appropriately.
- As the goal of this rotation is to familiarize yourself with chest imaging and pathology, we encourage you to read as many cases as possible. Try not to get bogged down in obtaining excessive history from the EMR or in reading a complex case; through practice, you will learn efficiency. Remember that the relevant history for a case may be as simple as a cancer diagnosis but, on the other hand, could hinge on the use of a single medication; you will become familiar with what history you will need for a given case over time. Do not hesitate to ask an attending to go over a complex case if you feel stuck, even if you are not "done" with it.
- For first and second years: While the attendings are dividing the CXR list alphabetically, you should feel free to read any and all cases to achieve your volume goals.

# **Volume Expectations:**

These should be regarded as a standard for "meets expectations" and will be factored into resident evaluations. We think these numbers are very doable, but if you feel like you are struggling, please ask an attending for help and advice!

daily volume	Week 1		Week 2	Week 3			Week 4	
	Day 1	Day 2	Days 3-5	Days 1-5	Day 1	Day 2	Days 3-5	Days 1-5
CXR	30	40	50	50	25	25	25	10
CT	0	0	0	0	4	5	5	10

### **First Year**

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daily	Week 1	Week 2	Week 3	Week 4
volume				
CXR	30	20	20	20
CT	6	8	8	10

### **Third Year**

daily	Week 1	Week 2	Week 3	Week 4
volume				
CXR	0*	0*	0*	0*
CT	15	15	15	15

\*Third year residents should check their progress toward the 1900 CXR requirement. If they are not on track to meet that, they should supplement chest radiographs during this rotation.

## **PACS Teaching Cases**

There are two lists of "Must See" cases, approx 150, one in the general Must See and approximately 40 in the Must See/PE cases. To access these cases on PACS, go to Chest Folder, scroll down to Must See cases; click on name to make them alphabetical, as one patient may have several different studies. This is to be done on your own time, not during clinical time!

## **Chest Conferences:**

- **A.** Time from 8:00-8:40 a.m. Monday thru Thursday **case conferences** to be given by attending radiologist. All the residents are required to attend the daily morning conferences.
- **B.** Journal Club conferences will be held on two Fridays per month. These journal articles will be presented by the residents and fellows on the rotation at that time. All residents, fellows, and attendings are to review the articles prior to the time of journal club. Dr. Hunsaker will assign residents the particular articles to be discussed.
- **C. Follow-up** conference is usually 2 Wednesdays per month, one led by fellows and one by residents. Trainees are expected to show 1-2 cases with pathology (preferable) or imaging follow-up demonstrating an interesting finding or diagnosis. Cases will be reviewed directly on PACS, no PowerPoint necessary.
- **D.** Radiology/Pathology Conference will each be held one Friday per month at 7:30 am.
- **E.** Thoracic Surgery/Radiology Conference is also held every Wednesday morning from 7:15 to 8:00 AM. It is expected that the residents will attend these conferences.

### **Evaluation of Residents:**

For first year residents, an online OSCE will be given during the last week of rotation. Evaluations will be based upon resident professionalism in the reading room, case volume, medical knowledge (based upon the OSCE and case conferences), and overall performance during the rotation.

# **GOALS:**

1. First year:

The first-year resident should be able to:

- 1. Demonstrate learning of the knowledge-based objectives as outlined in the Revised Curriculum on Cardiothoracic Radiology for Diagnostic Radiology Residency with goals and objectives related to general competencies (please see attached paper).
- 2. Accurately and concisely dictate a chest radiograph report. Residents should be able to preview all CT's and write their findings, after which they are to dictate the CT scan in a proper format. They are not necessarily required to pre-dictate the CT studies, however.
- 3. Residents are also required to protocol CT studies appropriately with the help of fellows and attendings.
- 4. Communicate effectively with referring clinicians and their supervisory staff. The communication with ordering physicians should include discussion of findings that are significant or unexpected. They should document accurately who was called, the date the person was called, and the time of the call of the dictated report.
- 5. Understand standard patient positioning in thoracic radiology.
- 6. Obtain pertinent patient information relative to the radiologic examination from the EMR.
- 7. Demonstrate knowledge of the clinical indications for obtaining a chest radiograph and when a chest CT or MR may be necessary.
- 8. Demonstrate a responsible work ethic.
- 9. Participate in quality improvement, quality assurance, and other operational activities of the service.
- 10. Please see suggested reading materials at the end of this handout.

# 2. Second Year:

In addition to the goals for year number one, the resident should be able to:

- 1. Demonstrate learning of the knowledge-based learning objectives (again, please see the attached document under the Addendum section. The resident should be competent in at least two-thirds of the material in this particular document).
- 2. Continue to build on chest radiographic interpretive skills.
- 3. Develop skills in protocoling, monitoring, and interpreting chest CT scans.
- 4. Teach medical students assigned to the rotation.
- 5. Please see suggested reading materials at the end of this handout.

# 3. Third Year:

- The resident in his/her third rotation in chest radiology is expected to build on the goals and objectives learned in the second year and should be able to function more independently and to aid the first-year residents or more junior residents and medical students on the rotation. They are to become a more autonomous consultant and teacher and correlate pathologic and clinical data with radiographic and chest CT findings. The 3<sup>rd</sup> year resident is expected to teach medical students assigned to the rotation.
- 2. Residents will be able to participate in interventional procedures, including accepting, planning, and execution of lung, mediastinal, and pleural biopsies. Specifically, they are to schedule biopsies with Laura after reviewing images with the attending radiologist and completing biopsy request forms. On the day prior to their assignment, they are to check all labs and review images with the attending that will actually be performing the

procedure with them. On the day of the procedure, the resident is to consent and appropriately participate in the biopsy.

3. Please see suggested reading materials at the end of this handout.

### 4. Fourth Year:

#### BRIGHAM AND WOMEN'S HOSPITAL THORACIC RADIOLOGY FELLOWSHIP SUMMARY OF PROGRAM

1. The **goal** of the 1 year Thoracic Radiology Fellowship in the 3:2 plan is to further the candidate's knowledge and skills in thoracic radiology and relate this to the clinical practice of pulmonary medicine and thoracic surgery.

The content and structure of the program encompass four areas:

a. <u>Clinical</u>

The 3:2 Fellow will participate in interpretation of plain chest radiographs, computed tomography and MRI of the chest, in addition to performing transthoracic needle biopsies under the direction of attending physicians within the Division of Thoracic Imaging in the Department of Radiology. The 3:2 Fellow also has the opportunity to participate in the PET/CT readings.

The 3:2 Fellow has the opportunity to benefit from a one- two month cardiovascular elective.

b. Educational

The 3:2 fellow will attend the didactic lecture course given to all radiology residents and attend the Harvard Chest Course held annually sponsored by Partners Radiology. The 3:2 Fellow will, to a limited extent, be responsible for education of radiology residents and medical students rotating through the Division of Thoracic Imaging, and medical and surgical house staff. He/she will do this under the direction of the attendings within the Division. Daily case reviews take place in the division and teaching given during this time.

The 3:2 Fellow is expected to lead out in two interdisciplinary conferences: 1) Monthly Pathology –Radiology Conference, coordinated by the 3:2 Fellow. B) Weekly Thoracic Surgery- Pathology- Radiology conference

c. <u>Research</u>

The 3:2 Fellow must be involved in one or more clinical research projects during their fellowship year. The 3:2 Fellow is expected to write 1-2 articles for publication during their year of training.

d. <u>Administrative</u>

Scheduled CT and MR studies are protocoled by the 3:2 Fellow daily. The 3:2 Fellow will be responsible for helping to organize lung biopsy procedures and the follow-up of biopsy procedure results, entering the results into a database for future projects.

#### BRIGHAM AND WOMEN'S HOSPITAL THORACIC RADIOLOGY FELLOWSHIP PROGRAM CURRICULUM

#### Plain radiography (100,000+ studies/year)

Read plain chest radiographs under supervision and understand in depth how to interpret, recognize, and analyze all radiographic signs of chest disease.

#### Computed tomography (15,000+ studies/year)

Interpret diagnostic CT studies with particular reference but not limited to:

- a. HRCT of interstitial lung disease
- b. Pulmonary thromboembolism
- c. Lung cancer staging
- d. Infections
- e. Congenital and immune deficient diseases

#### <u>MRI (~1000 exams/year)</u>

Understand and interpret MR studies of the brachial plexus, lung, mediastinum, and complex pleural diseases.

#### PET/CT

The 3:2 Fellow has the opportunity to review the PET/CT reporting. The studies are reported jointly by an attending thoracic radiologist and an attending from Nuclear Medicine.

The 3:2 Fellows will be expected to be able to interpret CT, MR and chest radiographic studies at high levels of accuracy by the  $6^{th}$  month.

#### Interventional Lung Procedures

The focus will be on the indications and benefits of percutaneous needle biopsy of lung lesions in neoplastic and inflammatory processes. Studies will be performed in CT fluoroscopy under direct staff supervision along with follow-up of patients for complications and treatment of pneumothorax. Pathological correlation of specimens obtained with tabulation of complication rates and true positive biopsy rates. Interesting cases will be presented once per month by the 3:2 Fellow at a Pathology Radiology conference.

Lung biopsy procedures and treatment of complications will be gradually learned under staff supervision so the 3:2 Fellow will be able to perform these studies independently by the 6<sup>th</sup> month but always under supervision.

#### **On-Call Responsibilities**

The 3:2 Fellow participates in weekend coverage with an Attending (Saturday, Sunday, and holiday) once per 5 weeks from 8 am to 4 pm. Duties include reading plain chest films, CT and MRI studies with the attending staff. Our fellowship program does not incur excessive hours as our 3:2 Fellows have no weekday on-call, and weekend on-call is confined to 8:00 am - 4:00 pm approximately once in every five weekends.

#### Vacation time

The 3:2 Fellow is granted 15 days of vacation, and one post-graduate meeting per fellowship year.

### **Suggested Reading:**

Residents may find they learn better through reading a textbook or individual articles relevant to cases they have seen during their rotation. Regardless, they will eventually be responsible for all of the material as described in the curriculum or the ABR syllabus. Thus, they will need to identify and fill in any gaps in their knowledge by the end of the third year.

## Online Resources

XrayPhysics (radiology physics) <u>http://xrayphysics.com</u> RadiologyAssistant <u>http://radiologyassistant.nl</u> - specific articles of note: HRCT Basic Interpretation, Mediastinum Lymph Node Map, Mediastium Masses HRCTEducation <u>http://www.hrcteducation.org</u>

## First Year Residents

### Suggested textbook

Hansell DM, Armstrong P, Lynch DA, McAdams HP. Imaging of Diseases of the Chest. 4<sup>th</sup> ed. Elsevier Mosby 2005. Chapters 1 thru 5; 7, 14. Please sign out textbooks from the Division secretary and return at end of rotation.

# Suggested articles

- Carter, Brett W., Marcelo F. Benveniste, Rachna Madan, Myrna C. Godoy, Patricia M. de Groot, Mylene T. Truong, Melissa L. Rosado-de-Christenson, and Edith M. Marom. "ITMIG Classification of Mediastinal Compartments and Multidisciplinary Approach to Mediastinal Masses." *RadioGraphics* 37, no. 2 (January 27, 2017): 413–36. doi:10.1148/rg.2017160095.
- Criado, Eva, Marcelo Sánchez, José Ramírez, Pedro Arguis, Teresa M. de Caralt, Rosario J. Perea, and Antonio Xaubet. "Pulmonary Sarcoidosis: Typical and Atypical Manifestations at High-Resolution CT with Pathologic Correlation." *RadioGraphics* 30, no. 6 (October 1, 2010): 1567–86. doi:10.1148/rg.306105512.
- 3. Gibbs, Jerry M., Chitra A. Chandrasekhar, Emma C. Ferguson, and Sandra A. A. Oldham. "Lines and Stripes: Where Did They Go? —From Conventional Radiography to CT." *RadioGraphics* 27, no. 1 (January 1, 2007): 33–48. doi:10.1148/rg.271065073.
- 4. Hammer, Mark M., Kareem Mawad, Fernando R. Gutierrez, and Sanjeev Bhalla. "Adult Cardiac Valvular Disease for the General Radiologist: Resident and Fellow Education Feature." *RadioGraphics* 35, no. 5 (September 1, 2015): 1358–59. doi:10.1148/rg.2015150006.
- MacMahon, Heber, David P. Naidich, Jin Mo Goo, Kyung Soo Lee, Ann N. C. Leung, John R. Mayo, Atul C. Mehta, et al. "Guidelines for Management of Incidental Pulmonary Nodules Detected on CT Images: From the Fleischner Society 2017." *Radiology* 284, no. 1 (February 23, 2017): 228–43. doi:10.1148/radiol.2017161659.
- Nachiappan, Arun C., Kasra Rahbar, Xiao Shi, Elizabeth S. Guy, Eduardo J. Mortani Barbosa, Girish S. Shroff, Daniel Ocazionez, Alan E. Schlesinger, Sharyn I. Katz, and Mark M. Hammer. "Pulmonary Tuberculosis: Role of Radiology in Diagnosis and Management." *RadioGraphics* 37, no. 1 (January 1, 2017): 52–72. doi:10.1148/rg.2017160032.
- 7. Truong, Mylene T., Jane P. Ko, Santiago E. Rossi, Ignacio Rossi, Chitra Viswanathan, John F. Bruzzi, Edith M. Marom, and Jeremy J. Erasmus. "Update in the Evaluation of the

Solitary Pulmonary Nodule." *RadioGraphics* 34, no. 6 (October 1, 2014): 1658–79. doi:10.1148/rg.346130092.

 Hansell, David M., Alexander A. Bankier, Heber MacMahon, Theresa C. McLoud, Nestor L. Müller, and Jacques Remy. "Fleischner Society: Glossary of Terms for Thoracic Imaging." *Radiology* 246, no. 3 (March 1, 2008): 697–722. doi:10.1148/radiol.2462070712.

# Second/Third Year Residents

# Suggested textbook

Hansell DM, Armstrong P, Lynch DA, McAdams HP. Imaging of Diseases of the Chest. 4<sup>th</sup> ed. Elsevier Mosby 2005. Review chapters from first year and add: chapters 6, 8, 9, 10, 11, 13, 15, 16.

# Suggested Articles

- 1. Attili, Anil K., Ella A. Kazerooni, Barry H. Gross, Kevin R. Flaherty, Jeffrey L. Myers, and Fernando J. Martinez. "Smoking-Related Interstitial Lung Disease: Radiologic-Clinical-Pathologic Correlation." *RadioGraphics* 28, no. 5 (September 1, 2008): 1383–96. doi:10.1148/rg.285075223.
- Jeong, Yeon Joo, Kun-Il Kim, Im Jeong Seo, Chang Hun Lee, Ki Nam Lee, Ki Nam Kim, Jeung Sook Kim, and Woon Jung Kwon. "Eosinophilic Lung Diseases: A Clinical, Radiologic, and Pathologic Overview." *RadioGraphics* 27, no. 3 (May 1, 2007): 617–37. doi:10.1148/rg.273065051.
- Kligerman, Seth J., Travis Henry, Cheng T. Lin, Teri J. Franks, and Jeffrey R. Galvin.
  "Mosaic Attenuation: Etiology, Methods of Differentiation, and Pitfalls." *RadioGraphics* 35, no. 5 (August 14, 2015): 1360–80. doi:10.1148/rg.2015140308.
- Li Ng, Yuen, Narinder Paul, Demetris Patsios, Anna Walsham, Tae-Bong Chung, Shaf Keshavjee, and Gordon Weisbrod. "Imaging of Lung Transplantation: Review." *American Journal of Roentgenology* 192, no. 3\_supplement (March 1, 2009): S1–13. doi:10.2214/AJR.07.7061.
- Milliron, Bethany, Travis S. Henry, Srihari Veeraraghavan, and Brent P. Little. "Bronchiectasis: Mechanisms and Imaging Clues of Associated Common and Uncommon Diseases." *RadioGraphics* 35, no. 4 (May 29, 2015): 1011–30. doi:10.1148/rg.2015140214.
- 6. Mueller-Mang, Christina, Claudia Grosse, Katharina Schmid, Leopold Stiebellehner, and Alexander A. Bankier. "What Every Radiologist Should Know about Idiopathic Interstitial Pneumonias." *RadioGraphics* 27, no. 3 (May 1, 2007): 595–615. doi:10.1148/rg.273065130. (*Older article but really nice diagrams*)
- Sverzellati, Nicola, David A. Lynch, David M. Hansell, Takeshi Johkoh, Talmadge E. King, and William D. Travis. "American Thoracic Society–European Respiratory Society Classification of the Idiopathic Interstitial Pneumonias: Advances in Knowledge since 2002." *RadioGraphics* 35, no. 7 (October 9, 2015): 1849–71. doi:10.1148/rg.2015140334.
- Winningham, Peter J., Santiago Martínez-Jiménez, Melissa L. Rosado-de-Christenson, Sonia L. Betancourt, Carlos S. Restrepo, and Andrés Eraso. "Bronchiolitis: A Practical Approach for the General Radiologist." *RadioGraphics* 37, no. 3 (March 31, 2017): 777– 94. doi:10.1148/rg.2017160131.

9. Chong, Semin, Kyung Soo Lee, Myung Jin Chung, Joungho Han, O Jung Kwon, and Tae Sung Kim. "Pneumoconiosis: Comparison of Imaging and Pathologic Findings." *RadioGraphics* 26, no. 1 (January 1, 2006): 59–77. doi:10.1148/rg.261055070.

<u>Fourth Year/Fellow</u> Suggested Textbook Webb, Muller, and Naidich. *High-Resolution CT of the Lung*.

### Suggested Articles

- Capobianco, Julia, Alexandre Grimberg, Bruna M. Thompson, Viviane B. Antunes, Dany Jasinowodolinski, and Gustavo S. P. Meirelles. "Thoracic Manifestations of Collagen Vascular Diseases." *RadioGraphics* 32, no. 1 (December 30, 2011): 33–50. doi:10.1148/rg.321105058.
- Cummings, Kristopher W., Sreevathsan Sridhar, Matthew S. Parsons, Cylen Javidan-Nejad, and Sanjeev Bhalla. "Cross-Sectional Imaging Anatomy and Pathologic Conditions Affecting Thoracic Nerves." *RadioGraphics* 37, no. 1 (December 2, 2016): 73–92. doi:10.1148/rg.2017160071.
- Sirajuddin, Arlene, Kirtee Raparia, Vanessa A. Lewis, Teri J. Franks, Sabeen Dhand, Jeffrey R. Galvin, and Charles S. White. "Primary Pulmonary Lymphoid Lesions: Radiologic and Pathologic Findings." *RadioGraphics* 36, no. 1 (January 1, 2016): 53–70. doi:10.1148/rg.2016140339.
- 4. Peña, Elena, Carolina A. Souza, Dante L. Escuissato, Marcio M. Gomes, David Allan, Jason Tay, and Carole J. Dennie. "Noninfectious Pulmonary Complications after Hematopoietic Stem Cell Transplantation: Practical Approach to Imaging Diagnosis." *RadioGraphics* 34, no. 3 (May 1, 2014): 663–83. doi:10.1148/rg.343135080.