

Welcome to Musculoskeletal (MSK) Radiology! House Officers are a critical component to the clinical aspect of MSK Radiology, participating in patient care and facilitating the performance, interpretation and reporting of imaging studies. The Musculoskeletal rotation is a balanced experience that provides radiology House Officers exposure to a broad spectrum of pathology with a variety of imaging modalities. MRI, CT and radiographs are reviewed, and there are opportunities to participate in arthrocentesis (joint aspirations) and arthrography and observe or participate in biopsies.

ROTATION GUIDE

1. Schedule/Responsibilities
 - a. Where to find the schedules for the rotation.
 - i. Residents at all levels will be assigned to this rotation throughout their training. Check the master schedule on the residents' webpage.
 - ii. Fellows will spend time in MSK radiology during their assigned months on Body MRI (on average, one week per month on Body MRI)
 - iii. Schedules are posted in the MSK Reading area (Consultation Room, JHOC 5019E)
 - iv. Procedures:
 1. Arthrography
 - a. Tues: MR Arthrography
 - b. Thursday: Routine non-MR Arthrography
 - c. Mon, Weds, Fri – Bill Scott referrals (1 per day)
 2. Biopsies:
 - a. Outpatient: Weds with overflow on Mondays
 - b. Inpatient: as needed
 - b. How to know who is responsible for covering things.
 - i. Responsibilities are determined by the total number of house officers (residents and fellows) on service during a given week. All diagnostic imaging is divided. Arthrocentesis and joint injections are shared so that all levels of house officers are trained to perform basic procedures. Biopsies are the responsibility of the MSK fellow.
 - ii. Generally, the first year resident assigned to the MSK rotation is responsible for reading out the Hopkins radiographs. She or he also should also try to attend at least one of the cross-sectional read out sessions as they occur throughout the day. The upper level residents primarily read out the MRI and CT examinations. If there is no first year assigned to MSK for the week, it is the upper level resident's responsibility to review the radiographs throughout the day, in between read out sessions.
 - c. How to find out who is on call for that rotation
 - i. Currently, residents do not take late call during this rotation.
 - ii. For on call cases, body staff cover.
 - iii. MSK or MRI fellow covers evening JHOC MRI contrast injections twice a week (TBD).
 - d. Where to go day by day.
 - i. Reading rooms are located on the 5th floor of JHOC , suite B in the Orthopedic Clinic
 - ii. There are three “exam” (reading) rooms in the suite. All workstations have eFilm for Teleradiology cases (American

Radiology Services and TLC) cases. Exam room 2 is mainly used for reading the MSK radiographs.

2. Conduct and Dress Code

- a. How to conduct oneself on the rotation.
 - i. MSK Radiology is typically a relaxed, friendly and productive environment. Professional conduct is expected. A “service oriented” attitude towards clinicians is essential. Feedback and suggestions are welcome.
- b. Dress code.
 - i. There is no specific dress code. Residents are expected to dress professionally.
 - ii. Note that you may be participating in procedures.
 - iii. Lab coats are not required but preferred if doing procedures.

3. Responsibilities, by modality:

- a. Radiographs performed at Hopkins
 - i. Final style dictations are expected for radiography interpretations (similar to those generated during the ER rotation). The following Talkstation lists should be reviewed during the day:
 1. Diagnostic Rad-JHOC—DGJ
 2. Diagnostic Rad-Ortho—DOJ
 3. Peds Ortho-POJ
 - ii. Staff will check out with the resident throughout the day to give them feedback on their reports. If the resident has questions, she or he should feel free to page the attending. One can find the attending responsible for JHH Ortho radiographs on the resident website under “Schedules-Diagnostic- current-MSK RAD”.
- b. Hopkins radiographs from ARS (Greenspring Station Sports Medicine)
Requests will be placed in the bin labeled “incoming radiographs” in room 5019F. Pull cases **AND THEIR COMPARISONS** on eFilm for review. These radiographs are reviewed with the attending covering MSK Cross-sectional (CT and MRI).
- c. Cross-sectional
 - i. Teleradiology (eFilm)
 1. Examinations from American Radiology Services (ARS)- House Officers are required to review cases sent throughout the day from ARS (about 30-40 MRIs/CT). The file clerk will prepare a packet of documents for each case. The packets are placed into plastic bins in the reading rooms labeled “in coming.” These cases need to be “retrieved” to the local workstation from the ARS Archive (very quick). **Make sure to pull prior relevant examinations.** If an exam does not appear on eFilm or you need comparison exams sent to the Archive, ask the file clerk for help in getting these cases transmitted (or describe problem on

cover sheet and place in the “problem bin”). Review **ALL** the papers within the packet. There are potentially 4 sources of history (3 in the packet): The cover sheet is the technologist notes, another sheet is the script from the referring physician, and an information sheet filled out by the patient describing symptoms and brief surgical histories. For Hopkins Ortho referrals there is often additional information in EPR (JHH or BVMC). Also, copies of prior relevant reports should also be included in the packet.

2. TLC (Northern Baltimore Imaging, LLC)
 - a. For these cases there is a separate Teleradiology bin in reading room (usually only a few a week)
 - b. Reading using eFilm: retrieve case from Teleradiology Archive (different than ARS Archive)
 - c. Use Talk Station to dictate [temporary report then delete afterwards]
 - i. Use name, DOB, and study number for identifiers
 - ii. Copy and paste into secure email
 - iii. Use the identifiers as the subject of the email
 - iv. Send report to nyrad@jhmi.edu with a copy for billing purposes to shayes8@jhmi.edu and copy to attending staff interpreting the case
 - v. Include staff signature block for each case you email
 1. Gautam Agrawal, M.D., Johns Hopkins Musculoskeletal Radiology
 2. John A. Carrino, M.D., M.P.H., Johns Hopkins Musculoskeletal Radiology
 3. Laura Fayad, M.D., Johns Hopkins Musculoskeletal Radiology
 - ii. Outside Consults and Comparisons (UV)
These examinations can be found under the Talk Station list “Musculoskeletal—Outside (MKO)”. Brief history and outside reports are scanned into Ultravisual, however one should research further pertinent information in RadAssistant or EPR before reviewing the case with the attending. Original films, CD, and referral papers are maintained in plastic film jackets in reading room 1 in a film holder file system organized alphabetically if needed (These are returned to the provider/patient by the file clerk when a final report is generated).
 - iii. JHH examinations – review the following Talkstation worklists:

1. Musculoskeletal—All CT (CKALL)
2. Musculoskeletal—All MR (MKALL)

iv. REPORTING

1. There are checklists (paper based and Talk) available folders in the reading rooms to help residents develop a systematic approach to the major MRI examinations: joints, tumors, spine, and neurography. Fill out these sheets as you review the study so that you are prepared for read-outs with the attending. If additional copies are needed, ask Rebecca Grager. Generally, previewing cases before read out sessions is probably the most effective approach to learning. Read-out sessions occur several times throughout the day with the attendings.
 2. After reading out with the attending, final style dictations should be entered for all cases. Dictate your studies under the attending assigned to MSK (XS or RAD). For all ARS examinations, generate final style dictations with a BODY section and an IMPRESSION section (including radiography). For ARS cases, we use a telephone dictation system. Instructions on how to use this service are printed out on a sheet of paper which is usually hanging on the viewbox in exam room 1 or 3. The dictation codes for the attendings are as follows: **Carrino-139, Fayad-058 and Agrawal-369**. The reports should include the order number (7 digit number, which is *not the MRN number*), date of study, type of examination, patient name, history, technique (including contrast dose), and comparison study date, findings and impression. **N.B. Only state the staff name when dictating (ARS does not include house officer names on the reports).**
- d. For all modalities (MRI, CT and radiography)
- i. Preview current imaging study and comparison(s). For ARS cases, you may need to request studies, comparisons and prior reports from the File Clerk.
 - ii. For referrals from Hopkins providers, additional history may be required from RadAssistant or EPR. For post operative patients, procedure note should be reviewed.
 - iii. Look up unfamiliar entities or surgical procedures on post operative patients. Pull any relevant literature.
- e. For joint injections (arthrocentesis)
- i. All house officers should be able to accomplish shoulder and hip joint access. House officers without experience will be given preference.
 - ii. Be proactive in gaining experience in joint procedures, if time allows and the rotation is not short staffed. Procedures are performed throughout the week (File Clerk will post). Discuss with

the MSK fellow how to split up the patients. On the day of the procedure, make sure the technologist on the fourth floor know to page you directly when your patient has arrived for the procedure so that you can consent the patient. After you have completed the procedure, make sure to dictate a report under the supervising attending's name.

- iii. Refer to Arthrocentesis training plan
- f. American Radiology Services (ARS) workflow: MRI, CT, radiography
 - i. ARS faxes requests to MSK Radiology and pushes images to gateway based on the RBR (Referral Based Reading) list composed of Hopkins and non-Hopkins providers.
 - ii. File Clerk organizes faxes and places into appropriate bin (In Box by modalities). Relevant prior exam reports are printed and requested from ARS.
 - iii. House Officer pulls case and relevant priors from gateway to local workstation and previews images using eFilm. Structured Report checklist is filled out to facilitate review.
 - iv. Staff reviews images. House Officer then dictates using telephone for ARS transcription service (refer to document: ARS dictation instructions). Once dictated place fax in appropriate bin (Outbox) for File Clerk to process **N.B. There are separate bins for radiography and cross-sectional examinations.**
 - v. Problem cases: Note problem on fax cover sheet (legibly) for file clerk and place in appropriate bin (Problem Box). For time sensitive cases communicate directly with File Clerk.
- 4. Dictations:
 - a. Who to dictate under:
 - i. Staff assigned to the rotation for that day: nominally one radiography and one cross-sectional (Mondays and Wednesdays there are usually 2 staff members for cross-sectional because of scheduled biopsies)
 - b. Whether to generate prelim-style or final-style dictations.
 - i. Generate final style dictations, using checklists or templates, for both Hopkins and ARS cases. Dictate all Hopkins and ARS cross sectional and ARS radiographs studies under the attending assigned to MSK XS for the day. Dictate final style dictations for Hopkins radiographs under the MSK RAD attending.
 - c. Whether you can use digital dictation and on which studies you can use it.
 - i. For Hopkins studies → Speech Recognition (Talkstation)
 - ii. For ARS studies → ARS Transcription Services (443-436-4249). For ARS cases, we use a telephone dictation system. Instructions on how to use this service are printed out on a sheet of paper which is usually hanging on the viewbox in exam room 1 or 3. The dictation codes for the attendings are as follows: **Carrino-139, Fayad-058 and Agrawal-369.** The reports should include the

order number (7 digit number, which is *not the MRN number*), date of study, type of examination, patient name, history, technique, and comparison study date, findings and impression. *See attachment: ARS dictation.* **N.B. Only state the staff name when dictating (ARS does not include house officer names on the reports).**

- d. Who to call for help and which attendings to go to first. Particularly, how to contact attendings after hours for that rotation.
 - i. 1st contact attending assigned to rotation
 - ii. After hours may contact Dr. Carrino if needed (pager and/or cell phone)
 - e. How to effectively follow-up on your reads.
 - i. Feedback will be provided to all House Officers
 - f. When to start and stop reading studies.
 - i. Residents are expected to start previewing at 9:15 AM (directly after AM conference).
 - ii. Fellows are expected to begin previewing at 7:30 AM.
 - g. How to turn over responsibilities to the next covering party.
 - i. House Officers are expected to be familiar with rotation guide
5. Frequent problems that come up on the rotation and how to troubleshoot (e.g. IT downtime etc.)
- a. Missing ARS images, comparisons or information → notify file clerk. If clerk is unavailable, the help desk at ARS is 443-436-4258.
 - b. Missing MRI or CT protocol → contact fellow or staff
 - c. Also some studies that are read by the MSK section are still being put under the “Body MR, Main MR, JHOC-Delaware” Talkstation list. Usually the resident/fellow on the body MRI rotation will page the resident or fellow on MSK to alert them of studies which should be read by the MSK section.
6. How to get the most out of the rotation.
- a. Read *prior* to rotation
 - b. Look up unfamiliar items
 - c. Ask questions thoughtfully and parsimoniously
 - d. Maintain list of interesting cases for conference
 - e. Contribute to the Teaching File
7. Stylistic preferences of the various attendings that staff the rotation.
- a. Structured Reporting (SR) is used to provide uniformity and enhance communication with referring providers
 - b. Refer to MSK Reporting Guidelines
8. What to expect from the clinicians who request your consultation.
- a. Majority of clinicians expect the staff radiologist to review and communicate findings with them

9. Best resources available to assist the resident in reading that modality and in performing any associated procedures:
 - a. Review articles
 - i. Compendium of articles will be made available in Groupwise shared folder
 - b. Books
 - i. Junior Residents

Theodore Miller
Mark Schweitzer
Diagnostic Musculoskeletal Imaging
McGraw-Hill Professional; 1st edition (October 15, 2004)
ISBN: 0071439625
 - ii. Senior Residents

Clyde A. Helms
Fundamentals of Skeletal Radiology
Elsevier Health Sciences; 3rd edition (November, 2004)
ISBN: 0721605702
 - iii. Senior Residents

Felix S. Chew
Catherine C. Roberts
Musculoskeletal Imaging : A Teaching File (Core Curriculum)
Lippincott Williams & Wilkins; 2nd edition c2005 (November 27, 2005).
ISBN: 0781757541
 - iv. **David W. Stoller, Miriam A. Bredella, Tirman Phillip F. J.**
Diagnostic Imaging: Orthopaedics
Elsevier Health Sciences; 1st edition (December 2003)
ISBN: 0721629202
 - c. PDF or Powerpoint files in groupwise shared folders
 - i. MSK Radiology Resources (being complied)
 - d. Pubmed links
 - i. Also recommend Google Scholar for more peer-reviewed searches
 - e. Teaching files online (and other on-line resources)
 - i. SSR website (<http://www.skeletalrad.org/>)
 - ii. e-anatomy (<http://www.e-anatomy.org/>)
 - iii. Wheeless Orthopaedic Textbook
(<http://www.whelessonline.com/>)
 - iv. Radiology Wiki (<http://www.radiologywiki.org/wiki>)
 - v. University of Washington
(<http://www.rad.washington.edu/maintf/BoneCaseList.html>)
 - f. Hardcopy teaching files at Hopkins
 - i. Currently being digitized
 - ii. Dr. Scott's hundreds of cases on Ultravisual (search under name "quiz")
 - g. Teaching file case lists
 - i. Will develop in version of UV that supports TFs (WIP)

10. Pertinent resident and faculty comments and advice to beginning residents.

The MSK rotation is a busy rotation, with many cases from a variety of modalities which to learn. Make every effort to show up on time directly after AM conference. Upon arriving, talk with the fellows to decide how to divide the worklists, so your responsibilities for the day are clear. The workflow on this rotation is different from that found on other rotations, and it is important to understand and keep abreast of all the worklists and examinations throughout the day in order to be efficient. The most effective learning comes from previewing cases, and making your own impression prior to attending read-out. Fill out the template and structured report sheets, or dictate preliminary reports into Talkstation to make read-outs with attendings efficient and instructive. To define complex anatomy, use the e-anatomy website when previewing the case.

Keep as many studies open as possible and eFilm and UV (typically 7-9 on eFilm) so that the cases do not need to be repulled during read-outs.

Make sure not to neglect the ARS radiographs. These cases are also part of the MSK learning experience. Again, decide how to divide these cases up with other residents/fellows.

Finally, communicate pertinent findings to referring clinicians by phone when appropriate, and document the notification in your reports. Try to be helpful and courteous to clinicians, and be sure to follow up on questions/concerns.

11. Faculty signature or an equivalent (email confirmation) indicating their approval of the above guide.

- a. This guide has been read and approved by
 - i. Gautam Agrawal, M.D.
 - ii. John A. Carrino, M.D., M.P.H.
 - iii. John Eng, M.D.
 - iv. Laura Fayad, M.D.
 - v. Donna Magid, M.D.
 - vi. William Scott, M.D.

CONFERENCES

1. Multidisciplinary Tumor conference on Wednesday mornings, 7 AM, JHOC 5th floor in the Orthopaedic Education Center.
2. MSK Curriculum – lectures by staff for residents will be given throughout the year from 7:30-9:00
3. Spine Conference, Tuesdays, 5-6PM, Meyer-1-191 conference room
4. Vascular Anomalies Conference, 7:00-8:00, once a month determined by IR
5. Foot and Ankle Conference (Union Memorial Hospital, Teleconference Room in the Hand Center), 7:00-8:00, every Friday (first Friday of the month is Sports Medicine)
6. Sports Medicine (Union Memorial Hospital, Stat Lab), 7:00-8:00, Friday (schedule posted)

PHONE NUMBERS

Becky Grager: 2-2831

File Clerk: 5-7779; FAX: 2-6976

Reading Room 1 (5019A): 2-6996

Reading Room 2 (5019D): 2-6989

Reading Room 3 (5019F): 2-6982

MSK Radiology “Team”

Staff

Radiography

John Eng, M.D.

Donna Magid, M.D.

William S. Scott, M.D.

Cross-sectional

Gautam Argawal, M.D.

John A. Carrino, M.D., M.P.H.

Laura Fayad, M.D.

Administrative Coordinator

Rebecca Grager

File Clerks

Irene Dozier

Judy Hasselberger