



Curriculum in Cardiac Imaging (revised 11-16-2013)

Faculty point person: **Iain McGhie, M.D.**

Associate Professor of Internal Medicine and Clinical Professor of Radiology, UMKC
Cardiology fellowship: University of Texas Southwestern Medical Center
Internal Medicine Residency: University of Glasgow, Scotland
Medical School: University of Glasgow, Scotland

Christopher M Walker, M.D.

Assistant Professor of Radiology, UMKC
Cardiothoracic imaging fellowship: Massachusetts General Hospital, Boston, MA
Diagnostic Radiology Residency: University of Washington, Seattle, WA
Medical School: University of Minnesota, Minneapolis, MN

UMKC/Saint Luke's hospital teaching faculty in Cardiac Radiology:

1. Timothy Bateman, MD (Nuclear cardiology and CTA – SLH)
2. Santiago Martinez, MD (SLH)
3. Melissa Rosado de Christenson, MD (SLH)
4. Jeffrey Kunin, MD (SLH)
5. Randall C. Thompson, MD (Nuclear cardiology and CTA - SLH)
6. Kevin Bybee, MD (Nuclear cardiology and CTA - SLH)
7. Kristin Fickenscher MD (Pediatric Radiology - CMH)
8. Niel Mardis, DO (Pediatric Radiology - CMH)
9. Radhika Gupta, MD (KCVA)
10. Josh Knowlton, MD (CMH)

Core lecture series in Cardiac Radiology

Core lectures - Monthly Friday 12:00pm

1. Fundamentals of the Gamma Camera
2. Basics of Cardiac SPECT, part 1
3. Basics of Cardiac SPECT, part 2
4. Gender Issues in Nuclear Imaging
5. Appropriateness Criteria for SPECT & CT
6. Assessment of Myocardia Viability
7. CT Coronary angiography
8. Radionuclide ventriculography
9. Radiation in cardiac imaging
10. MPI and prognosis in acute and chronic coronary artery disease
11. Introduction to Pediatric Cardiac Imaging (Biannual lecture Thurs 3:30 at CMH) – part of ped rad curriculum

Core case-based lectures by chest faculty at SLH: Monday or Tuesday at 7:30 AM. 1-2 lectures/month with rotating curriculum every 2 years

1. Introduction to cardiac MRI.
2. Coronary arteries, part 1: Ischemic applications of CTA
3. Coronary arteries, part 2: Nonischemic applications of CTA
4. Cardiac masses, part 1
5. Cardiac masses, part 2
6. Cardiac masses, part 3
7. Late gadolinium enhancement and first pass perfusion, part 1
8. Late gadolinium enhancement and first pass perfusion, part 2
9. Myocardium
10. Devices, part 1: Valves, transcatheter aortic valve replacement, complications
11. Devices, part 2: Pacemakers and their complications, Closure devices
12. Devices, part 3: Circulatory assist devices and their complications
13. The normal pericardium
14. The abnormal pericardium
15. Pericardium, part 1
16. Pericardium, part 2
17. Aorta, part 1
18. Aorta, part 2
19. Valves, part 1
20. Valves, part 2
21. Congenital, part 1
22. Congenital, part 2
23. Miscellaneous topics, part 1
24. Miscellaneous topics, part 2

This curriculum is supplemented by the following interdisciplinary lectures:

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|----------|---------|-----------------------------|
| 1. SLH - | Monthly | Cath Correlation Conf |
| 2. SLH - | Monthly | Journal club |
| 3. SLH - | Monthly | Interesting case conference |

Cardiac Imaging – Rotation 1

General overview

Radiology resident rotations in Cardiac imaging will include at least the equivalent of 2 months during the radiology residency. These rotations focus on adult imaging since pediatrics is recognized as a separate section of subspecialty training in radiology, although overlap is inevitable. All aspects of cardiac imaging will be incorporated into the residency, including Nuclear Cardiac SPECT, PET, and CT angiography (in conjunction with fellowship trained Cardiology/Radiology faculty at SLH), Pediatric Cardiology (in conjunction with Pediatric Radiology fellowship faculty at CMH), Cardiac MRI and CTA (in conjunction with thoracic and MRI fellowship trained faculty at SLH and TMC).

Resident responsibilities during Cardiac imaging rotation:

1. The resident is involved in the daily conduct of Cardiac Imaging services.
2. The resident should review and observe reading of cardiac imaging studies with an understanding of the disease processes specific to the patient population;
3. Examinations should be checked by the resident before the patient leaves the department if requested to do so by the supervising faculty.

4. Any questions should be referred to the supervising faculty covering cardiac imaging.
5. Review of cases with the supervising faculty will be conducted as many times in the day as necessary to keep an efficient work flow.
6. The resident will form a preliminary impression on each study and compare their impression with the final faculty interpretation.

Staff responsibilities:

1. Supervising faculty should be available at all times for any questions or consultations needed by the resident.
2. Supervising faculty should review all cases with the resident before the end of the day.
3. Supervising faculty should provide the resident with constructive feedback in any problem areas encountered during the rotation.

Resident evaluation: As per description in UMKC Radiology Residency Handbook.

Specifically, the radiology residents will be evaluated at the end of each rotation (once a month). The faculty member will complete an evaluation form sent to him/her by the Radiology residency coordinator, Daphne Urquhart 932-2237, and return it to her. The evaluations will be discussed with the Program Director at least semiannually.

Cardiac imaging – Rotation 1 - goals and objectives

I. **Patient care:**

- (a) The resident should understand and be able to communicate to the patient the indications for the cardiac exams
- (b) The resident should correlate the imaging exams with the clinical history by using the available medical records, knowing how to access them for purposes of patient care.
- (c) All studies should be reviewed with supervising faculty attending.

II. **Medical Knowledge:**

- (a) The resident should become comfortable with basic cardiac imaging techniques and scans.
- (b) The resident should gain knowledge of nuclear agents for each exam and the specific properties as they pertain to cardiac imaging and safety;
- (c) The resident should understand radiation safety and how it affects the appropriateness of the exam;
- (d) The resident should understand Cardiac imaging physics as it pertains to imaging studies and findings
- (e) The resident should be familiar with the anatomy of the organs examined in every case. An atlas of cross-sectional anatomy should be consulted when there is any doubt.
- (f) The resident should review cardiovascular CT angiography studies with an understanding of the disease processes specific to the patient population, including congenital and acquired conditions.
- (g) The resident should be familiar with cardiac imaging findings in the disease entity suspected, and if the resident is not familiar with the disease entity or expected findings on cardiac imaging scans, he/she should recognize their limitations and consult with supervising faculty or appropriate reading material.

III. **Practice Based Learning and Improvement:**

- (a) The resident should demonstrate evidence of independent reading and learning through the use of printed and electronic sources.
- (b) The resident should participate in radiology and core cardiology conferences.
- (c) Follow-up of abnormal or interesting studies should be accomplished through personal communication with the referring physician or patient medical records.

- (d) The resident should be competent in using the cardiac imaging PACS in the daily accomplishment of the work load and instruct others in its use.

IV. **Interpersonal Communication Skills:**

- (a) The resident should assist with interpretation and dictation of studies as instructed by the faculty.
- (b) The resident should develop an understanding of clear, concise reports and communication with the clinicians as needed.
- (c) The resident should be able to communicate effectively results of studies to referring clinicians whenever needed.

V. **Professionalism:**

- (a) Residents should be able to explain the nature of the examination or findings in an examination to patients and their families when needed.
- (b) Residents should observe ethical principles regarding further work-up for cases.
- (c) Promptness and availability at work are expected of every resident.
- (d) Residents should dress appropriately at work, wearing a name badge at all times.
- (e) Cardiac imaging technologists and other health workers should be treated with respect and part of the health care team.
- (f) Patient confidentiality should be observed at all times.
- (g) Residents are required to complete an on line professionalism module at least biannually.

VI. **System Based practice:**

- (a) Residents should be familiar with departmental procedures necessary in the performance of the examination.
- (b) Residents should learn appropriate language to be used in communicating to clinicians through reports or consultations so proper management decisions can be made.
- (c) Residents should assist with interpretation and dictation of studies in a timely fashion to avoid delay in patient disposition.
- (d) Residents should assist in facilitating examinations whenever possible.
- (e) Suggestions to improve methods and systems utilized in radiology should be made whenever appropriate.

Reading list:

1. Problem Solving in Cardiovascular Imaging: Expert Consult- Abbara S and Kalva SP. 2012. Overall the best textbook available on the subject in my opinion. I would stay away from cardiac imaging the requisites as it is poorly written with few images.
2. Cardiac imaging: Case review series- Reddy GP, Steiner RM, and Walker CM. 2013.
3. Essentials in Nuclear Medicine Imaging: Expert Consult, cardiac chapter – Mettler F, Guiberteau MJ. Saunders. 2012
4. Radiographics articles on cardiac imaging

Cardiac Imaging – Rotation 2

General overview

Radiology resident rotations in Cardiac imaging will include at least the equivalent of 2 months during the radiology residency. All aspects of cardiac imaging will be incorporated into the residency, including Nuclear Cardiac SPECT, PET, and CT angiography (in conjunction with fellowship trained Cardiology/Radiology faculty at SLH), Pediatric Cardiology (in conjunction with Pediatric Radiology

fellowship faculty at CMH), Cardiac MRI and CTA (in conjunction with thoracic and MRI fellowship trained faculty at SLH and TMC).

Resident responsibilities during Cardiac imaging rotation:

1. The resident is involved in the daily conduct of Cardiac Imaging services.
2. The resident should review and observe reading of cardiac imaging studies with an understanding of the disease processes specific to the patient population;
3. Examinations should be checked by the resident before the patient leaves the department if requested to do so by the supervising faculty.
4. Any questions should be referred to the supervising faculty covering cardiac imaging.
5. Review of cases with the supervising faculty will be conducted as many times in the day as necessary to keep an efficient work flow.
6. The resident will form a preliminary impression on each study and compare their impression with the final faculty interpretation.

Staff responsibilities:

1. Supervising faculty should be available at all times for any questions or consultations needed by the resident.
2. Supervising faculty should review all cases with the resident before the end of the day.
3. Supervising faculty should provide the resident with constructive feedback in any problem areas encountered during the rotation.

Resident evaluation: As per description in UMKC Radiology Residency Handbook.

Specifically, the radiology residents will be evaluated at the end of each rotation (once a month). The faculty member will complete an evaluation form sent to him/her by the Radiology residency coordinator, Daphne Urquhart 932-2237, and return it to her. The evaluations will be discussed with the Program Director at least semiannually.

Cardiac imaging – Rotation 2 - goals and objectives

I. **Patient care:**

- (a) The resident should refine his/her understanding of the indications for cardiac exams and be able to thoroughly communicate such indications to the patient as needed
- (b) The resident should be able correlate the details of imaging exam findings with those of the clinical history
- (c) The resident should have a thorough knowledge of how to access patient information for purposes of patient care.
- (d) The resident should be able to cope with a high volume of studies, reviewing them all with the supervising faculty attending.

II. **Medical Knowledge:**

- (a) The resident should refine his/her comfort level with basic cardiac imaging techniques and scans, being able to discuss them in detail with clinicians, supervising faculty and other resident trainees.
- (b) The resident should refine his/her knowledge of nuclear agents for each exam and the specific properties as they pertain to cardiac imaging and safety.
- (c) The resident should have a thorough understanding of radiation safety and how it affects the appropriateness of the exam.
- (d) The resident continue to gain an understanding of Cardiac imaging physics as it pertains to imaging studies and findings

- (e) The resident should continue to become more familiar with details of anatomy observed during cardiac imaging studies in every case.
- (f) The resident should review cardiovascular nuclear and CT angiography studies with an understanding of the disease processes specific to the patient population, including congenital and acquired conditions.
- (g) The resident should become more familiar with cardiac imaging findings in the disease entity suspected, and should focus on filling in gaps in this knowledge.
- (h) Residents should recognize their limitations and consult with supervising faculty or appropriate reading material as needed.

III. **Practice Based Learning and Improvement:**

- (a) The resident should demonstrate increasing evidence of independent reading and learning through the use of printed and electronic sources.
- (b) The resident should continue participate in radiology and core cardiology conferences.
- (c) The resident should continue to demonstrate evidence of follow-up of abnormal or interesting studies, which can be accomplished through personal communication with the referring physician or patient medical records.
- (d) The resident should be competent in using the cardiac imaging PACS in the daily accomplishment of the work load and instruct others in its use.

IV. **Interpersonal Communication Skills:**

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- (a) Residents should be familiar with departmental procedures necessary in the performance of the examination.
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