RESPONSIBILITIES OF CLINICAL CARDIOLOGY FELLOWS DURING
CARDIAC IMAGING ROTATION/SERVICE (1 MONTH)

A one-month rotation for first year clinical fellows designed to provide an introduction to cardiovascular MR and CT through attendance and performance of CMR and CT examinations on patients referred for clinical evaluation, didactic training, and self-study of texts and image training sets.

Please note: Second and third year fellows may take this rotation as a "1-Month Elective".

Goals for CT (Based on COCATS 4, Task Force 7):

1. Know the principles of cardiovascular computed tomographic scanning and the scanning modes.
2. Know the risks and safety measures for cardiovascular computed tomographic scanning, including radiation reduction strategies.
3. Know the appropriate indications for cardiovascular computed tomography for screening or evaluating symptoms in patients with suspected cardiac disease.
4. Know the indications, potential adverse effects, prevention and treatment of complications of iodinated contrast agent used in cardiovascular computed tomographic studies.
5. Know the characteristic cardiovascular computed tomographic images of normal cardiac chambers and great vessels, normal coronary arteries and veins, and normal variants.
6. Know when to request help with interpretation of difficult studies, such as patients with complex congenital heart disease.
7. Develop skill to appropriately utilize cardiovascular computed tomography in the evaluation and management of patients with known or suspected cardiovascular disease.
8. Develop skill to integrate cardiovascular computed tomographic findings with other clinical information in patient evaluation and management.
9. Develop skill to recognize and treat contrast-related adverse reactions.
10. Incorporate appropriate use criteria, risk/benefit, and cost considerations in the use of cardiovascular computed tomography and alternative imaging modalities.
11. Identify knowledge and performance gaps and engage in opportunities to achieve focused education and performance improvement.
12. Utilize, know and promote point-of-care educational resources (appropriate use, guidelines, etc.).
13. Communicate results effectively to referring physicians, including the significance of the finding.

Goals for MR (Based on COCATS 4, Task Force 8):

1. Know the principles of cardiovascular magnetic resonance image acquisition.
2. Know the principles of safety and contraindications for cardiovascular magnetic resonance imaging.
3. Know the uses, potential side effects, and contraindications of using gadolinium-based contrast agents in cardiovascular magnetic resonance imaging..
4. Know the indications for cardiovascular magnetic resonance to assess left and right heart chamber sizes and function.
5. Know the cardiovascular magnetic resonance indications for assessment of myocardial viability.
6. Know the cardiovascular magnetic resonance indications and characteristic findings of myocardial ischemia.
7. Know the cardiovascular magnetic resonance indications and characteristic findings of acute coronary syndromes and other causes of myocardial injury.
8. Know the cardiovascular magnetic resonance indications and characteristic findings of acute myocardial infarction.
9. Know the cardiovascular magnetic resonance indications and differential findings in cardiomyopathies of uncertain cause.
10. Know the cardiovascular magnetic resonance indications to assess disease of the pericardium.
11. Know the cardiovascular magnetic resonance indications to assess valvular heart disease.
12. Know the cardiovascular magnetic resonance indications and characteristic findings of myocardial masses and thrombi.
13. Know the cardiovascular magnetic resonance (and CT) indications for left atrial and pulmonary vein mapping prior to ablation of atrial fibrillation.
14. Know the cardiovascular magnetic resonance indications for evaluation of adult congenital heart disease including identification of coronary artery anomalies.
15. Know the cardiovascular magnetic resonance indications to detect and evaluate disease of the aorta and peripheral arteries.
16. Develop skill to appropriately order and integrate the results of cardiovascular magnetic resonance testing with other clinical findings in the evaluation and management of patients.

17. Develop skill to interpret cardiovascular magnetic resonance tissue characterization (late gadolinium enhancement) to distinguish the etiology of cardiomyopathy and acute myocardial injury.
18. Incorporate risk/benefit and cost considerations in the use of cardiovascular magnetic resonance testing. Identify knowledge and performance gaps and engage in opportunities to achieve focused education and performance improvement.
19. Know and promote adherence to guidelines and appropriate use criteria.
20. Know how to practice within the scope of one's expertise and technical skill.
21. Know how to communicate test results effectively to referring physicians, including the significance of the finding.

Staff: Woodard, Bhalla, Bhandiwad, Bierhals, Gutierrez, Javidan, Raptis.

Exams Performed on this Service:

I. Clinical Cardiac MR

- RV dysplasia, tumors, pericarditis, cardiomyopathies
- Congenital heart disease
- Valve disease assessment
- Left ventricular function (at rest, without pharmacologic stress)
- Coronary MR angiography (for anomalous coronaries)
- Late gadolinium enhanced imaging (viability imaging) for infarct assessment
- Aortic studies for aneurysm assessment and follow-up, dissection follow-up, coarctation assessment and repair
- Myocardial pharmacological stress perfusion/function (adenosine/regadenoson)

II. Clinical Cardiac CT

- Congenital heart disease
- Coronary CT angiography
- Pericardial disease
- Pulmonary venous anatomy pre RF ablation
- Calcium scoring
- Valve CT fluoroscopy
- Pre-TAVI planning
- Pre-MitraClip planning
- Pre-LARIAT planning
- Redo-sternotomy for pre-surgical planning

III. Other Cardiac Imaging

- Valve fluoroscopy

IV. Resident and Fellow Responsibilities:

Night before – Check the MR and CT schedules for cardiac cases (Erica Pollock or Libby Fieseler will send you and e-mail regarding all scheduled outpatient cases)
8:00-8:30 AM – Meet with Cardiac Imaging attending, 3rd floor reading room to go over protocoling, review the potential cases for the day, arrange time for read-out.

Reading Room: 3rd floor CAM.

Reading Room Phone: 454-7155

Logbook – Please list all cases done in the procedure log at *My*Evaluations.com.

Responsibilities by exam type:

V. Clinical Cardiac MR

1. Discuss the protocol with the attending.
2. Monitor the Exam.
3. Post-process (initially with assistance) flow quantification cases (for regurgitant flow, stenosis gradient or shunt ratio), and all cases requiring ejection fraction calculation. Some cases (those with MRA) may benefit from 3D reformat.

Clinical Cardiac CT

1. Discuss the exam, protocol. For coronary CT angiography, studies on the **Sensation 64 (North or South), Sensation 128 (North), FLASH Scanner (ED)**. Talk to the patient and check heart rate and blood pressure. See attached sheet regarding Performance of Coronary CT Angiography and administration of IV Lopressor, if needed. There's a tackle box with Lopressor in the charge tech area.
2. Ensure that technologist is aware of the protocol.
3. Post-process CT images.

Other responsibilities:

1. Tues AM Follow-up: Obtain and show cardiac MR/CT cases for this conference (5-7 cases). This is done in collaboration with the radiology resident.

IMPORTANT PHONE/PAGER NUMBERS

- Radiology Attendings:
    - Woodard: 790-8414
    - Bhalla: 841-9608
    - Bhandiwad: 491-6751
    - Bierhals: 663-0242
    - Gutierrez: 836-9590
    - Raptis: 841-0564

Recommended Texts:

Cardiovascular MR Imaging: Physical Principles to Practical Protocols by Vivian S. Lee (2005; Lippincott)

Cardiovascular Magnetic Resonance by Warren J. Manning MD and Dudley J. Pennell MM (2010; Saunders)

The Complete Guide to Cardiac CT by Simeon Abramson (2011; McGraw Hill)

Cardiac CT Imaging: Diagnosis of Cardiovascular Disease by Matthew J. Budoff and Jerold S. Shinbane (2010; Springer)

Cardiovascular MRI in Congenital Heart Disease: An Imaging Atlas by Shankar Sridharan, Gemma Price, Oliver Tann , Marina Hughes, Vivek Muthurangu , Andrew M. Taylor (2010; Springer)

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