

DEPARTMENT OF MEDICAL IMAGING RESIDENT ORIENTATION



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Welcome to St. Michael's Department of Medical Imaging. Please take the time to review this orientation manual carefully.

St. Michael's residency site coordinator is Dr. Vikram Prabhudesai, Room 3-122 CC, ext. 6702, prabhudesai@smh.toronto.on.ca

(Message from VP: If during your time here you run into anything you think I can help you with, please contact me or send me an by e-mail.)

1. IF THIS IS YOUR FIRST TIME HERE

There are three things you need to do before you start work – go to Medical Education, located on 1-Bond, get RIS/PACS trained, and get a TLD badge:

A. Go to Postgraduate Medical Education

The first thing you need to do is register with the hospital's Medical Education Department located at 1-Bond. Bryan Abankwah is the Post-graduate Coordinator (ext. 2767, abankwahb@smh.toronto.on.ca). He will help you get your:

Hospital ID badges.

Laundry (lab coat, scrubs).

Parking if needed (you must pay for this yourself).

Once you've finished up with Postgraduate Medical Education you can come to Medical Imaging, 3-CC for department orientation and training.

This is a link for some more information for PGME at SMH

<http://www.stmichaelshospital.com/pdf/education/postgraduate/welcome.pdf>

B. Get PACS training

The PACS office is in room 3-101CC. The RIS/PACS Team will provide an information package. Contact numbers for the RIS/PACS team are as follows:

Martin Kepa - PACS Admin

Ext - 3133

Pg - 416-685-4409

Irene Arruda - RIS Admin

Ext - 2113

Pg - 416-685-9355

Daniel Pharand - RIS/PACS Support

Ext - 2943

Pg - 416-685-9100

Hao Tran - RIS/PACS Support

Ext - 3285

Pg - 416-685-9435

Christian Moran - RIS/PACS Support

Ext - 6335

Pg - 416-685-9927

C. Get a TLD badge:

Please get one as soon as possible and wear it at all times. Contact Jim Fellowes (ext. 2883, fellowesj@smhl.toronto.on.ca).

D. Dr. Glen Bandiera

You may contact Dr Glen Bandiera, Director, Postgraduate Medical Education on 416-864-6060 ext 6948, or BandieraG@smh.toronto.on.ca. He is responsible for residents at SMH, and you may approach him with any problems, that you feel haven't been addressed by your site coordinator.

2. IMPORTANT THINGS YOU SHOULD KNOW

- a. **Lockers:** There are full lockers for residents across from Nuclear Medicine. If you would like one of these, please let Bev Penny (PENNYB@smh.toronto.on.ca) know.
- b. **Mail slots:** Available for residents in the central reporting room, opposite CT3. Please ensure that your name is on a pigeon hole. Please check these boxes frequently.
- c. **Rounds:** The resident rounds schedule is posted in the call room, and on several bulletin boards throughout the department. Attendance at all rounds listed on the schedule is mandatory.
 - Morning rounds start on time. Everyone should be present and seated in the seminar room by 8:00 AM.
 - Please bring your lunch to mid-day rounds then return to your service after these rounds end.

There are many other rounds every week including an assortment of multidisciplinary rounds, tumour board rounds, etc. Residents may attend these rounds if they are relevant to their current rotation.
- d. **Lunch:** The radiologists host a lunch for the fellows and residents on the 1st Thursday (during resident rounds) of the month starting around noon.

IMPORTANT PHONE NUMBERS:

- Cardiac arrest team (code blue): 2222
- Fire: 5555
- Security: 5012
- Locating: 5431

Paging system: If you do not know the pager # of the person you are trying to contact, please call locating at 5431.

Call room: 3- 007 CC. Get the code from the chief resident or Bev. If there are any problems with the cleanliness of this room, please e-mail or call Bev immediately (Please also inform VP).

3. CALL

a. General information

1. The call period:
 - Weekdays: 5:00 PM to 9:00 AM (but must carry pager from 9:00 AM to 9:00 AM – see below)
 - Weekends: 9:00 AM to 9:00 AM.
2. Pick up the pager at 9:00 AM on weekends and at morning rounds on weekdays. The resident on call is rarely paged before 5:00 PM on weekdays but should be available by pager throughout the day. Clinical services will likely not be aware that your call “officially” starts in the evening so if you are paged before 5:00 PM, please direct the caller to the appropriate department or radiologist.
3. Call is “in-house”. Residents are required to remain in the hospital throughout the call period.

As per the discussion at the RTC, there will be a backup system for call for all the junior (R1) residents starting call in September. This will be till the end of period 7.

Juniors will take call with a frequency of 1:7 with backup. They will take first call with seniors for help and advice only, although both will be jointly responsible. The seniors will be available when needed. It is expected that in the initial few weeks the seniors will be on-site offering help/advice for longer periods and as the juniors get more comfortable and confident the seniors may not be required to stay in as much. They will however be expected to be available for help and advice.

For cases that need immediate attention or may impact emergent patient management the Staff Radiologist must be called as per policy guidelines. Technical and practical issues are to be taken up with the senior.

Seniors will have home access. There is an on-call room if the senior wishes to stay in-house. The key for the room is available through security. PAIRO guidelines will apply for the seniors. If call has been busy they will be allowed home after 12:00 pm. Otherwise stay as usual. The first call resident will be going home as usual at 09:00 am.

b. RESIDENT RESPONSIBILITIES ON CALL:

- Screening all calls for fluoroscopy, Ultrasound, Nuclear Medicine, CT and MRI: (Note: For VIR cases please ask the service to speak to the VIR person on-call directly. If any resident is interested in a procedure, they are welcome to get involved)
- Arranging, supervising and providing timely preliminary reports for all appropriately indicated after-hours fluoroscopy, Ultrasound, Nuclear Medicine, CT and MRI exams.
- Supervising contrast injections after 1700h and dealing with any adverse reactions that may crop up (see section on contrast reactions). A physician must always be available in the department when contrast is being administered. Before leaving the department please inform the CT technologist.
- Communicating findings to the responsible clinical services for all fluoroscopy, Ultrasound, Nuclear Medicine, CT and MRI studies (plus any plain films for which an opinion is requested) done during the call period. In all cases this means writing a preliminary report but in some cases this will also mean calling the service directly to discuss a case.
- Arranging next working day studies and procedures in instances where they do not need to be done on an urgent, after-hours basis.

c. PRELIMINARY REPORTS ON CALL

- Preliminary reports must be written for **all** urgent fluoroscopy, Ultrasound, Nuclear Medicine, CT and MRI exams that are done during the call period. We make every effort to not do “routine” inpatient studies after hours (although a few may slip through), so what this effectively means is that **all inpatient ultrasound, nuclear medicine, CT and MR studies done during the call period must be given preliminary reports.**
- You should also write preliminary reports for all plain films you are asked to review. Write a concise preliminary report. If there are any urgent/unexpected important findings you should call the referring service directly and tell them what they are (in addition to writing them down). Record that you’ve done this by writing “Dr. X informed at ...”).

What should go in a preliminary report?

- Remember, because these aren’t final reports their purpose is different; it is not to describe every single finding such as hiatus hernias and granulomas. **The purpose of the preliminary report is to answer the question being asked and to advise the clinical service of any other findings of immediate importance or that need follow-up** (e.g., incidental renal cell carcinoma on a trauma CT or a lung nodule that needs follow-up).
- After each case, you are responsible to communicate the findings to the referring clinical service. Residents may communicate verbally and/or fax a written preliminary report. Make 2 copies of your written preliminary report (using Powerscribe or Word). One copy is to be stapled to the requisition and will be available for final readout. Keep the other copy for personal case review.

a. STAFF RADIOLOGIST COVERAGE ON CALL

Four Staff Radiologists are available on call at all times. The radiologists' call schedule is posted in the call room and on several bulletin boards. If you need to contact a radiologist, please refer to their specific listing in "On Call This Week" to see if they have a preference about how they should be reached (some prefer to be paged, others prefer phone calls). If you are unable to reach someone using their preferred method, try a different method or page one of the other Staff Radiologists on call.

Note: Do not give any staff's contact information (pager or phone numbers) to callers unless given permission to do so by the radiologist in question. If a caller does not want to go through you to reach someone, refer them to Locating at extension 5431.

- 1. General:**
- 2. Cross-sectional/Body:**
- 3. Neuroradiology:**
- 4. Interventional:**

All staff are expected to have remote access to PACS from home. If you need help interpreting a study and the responsible staff radiologist is somewhere without remote access, they may have to come in to the department to view the exam.

Do not hesitate to page the covering staff radiologist at any time if you need help with something that will have an impact on the immediate care a patient will receive. We would prefer that you call us instead of trying to go it alone.

For questions around non-urgent matters, please wait to review the staff's report or discuss the matter with them electively.

b. MEDICAL IMAGING SERVICES ON CALL

1. CT:

There is a technologist in house and the pager is 416-685-0200. When you approve an after-hours CT exam, you must "protocol" the request, which means indicating which CT protocol(s) the tech should use. All CT protocols are kept in binders in the scan rooms. Please do not make up your own protocols or ask technologists to change protocols.

2. Nuclear Medicine:

Urgent nuclear medicine investigations (the only indications are VQ scans for patients unable to have CT, Active GI bleed scans and brain death) are only available on weekends and holidays between 8am-8pm. **Please page the technologist on-call for Nuclear Medicine at 416-685-9796.** The on call resident is responsible for reading these exams, except for brain death which requires an interpretation by a Staff Radiologist. If the resident cannot read the scans please discuss with the Staff radiologist before accepting the case.

3. Ultrasound:

FAST scans: Residents are currently responsible for FAST ultrasounds in trauma cases. When you receive a trauma page, you are expected to go to the trauma room, declare yourself as radiology and do the FAST. Often the trauma team may have done the FAST themselves in which case, you are not required to repeat it.

ON CALL scans: Technologists are paged through locating. The call schedule is updated in the resident call room, and at present the department is working on a method to have it also emailed to the residents.

If you approve an after-hours Ultrasound study give the following information and give it to the technologist.

- i) Patient name and number.
- ii) Patient location.
- iii) Clinical history (reason for the exam).
- iv) Pertinent lab work (e.g., beta HCG, WBC count, INR if doing a procedure, etc.).

Ultrasound technologists are on call as follows.

Weeknights: During the week nights the technologists are on call for 24 hrs. Call starts at 1700 hours. Between 2300 hrs and 0800 hrs there are specific criteria for calling in the technologist. These include: testicular/ ovarian torsion, renal transplant ultrasounds and ectopic pregnancy. Other scans can be done at the discretion of the resident.

Weekends: On weekends, there is a technologist that is scheduled to be in-house from **1000 hrs to 1800 hrs**. This technologist will be responsible for all urgent ultrasounds (ER and inpatients), as approved by the resident. In patient

leg Doppler studies are done by the technologist without prior approval from the resident.

On *Friday* nights and *Saturday* nights there is a scheduling book in the ER where the ER physicians give urgent patients an appointment time for ultrasounds the following morning. These are patients that require urgent ultrasounds that can wait for the following morning (but not beyond that). These patients are booked from 1000 hrs to 1200 hrs. The ultrasound technologist on the weekend, are aware of these patients and will perform the ultrasounds. The resident will review these studies and issue a preliminary report, as these are essentially ER patients. The patients will then return to the ER with a hand written report.

Times outside of 1000 hrs to 1800 hrs are handled as stated on weeknights*.

Statutory holidays: At this time there is no technologist that is in house on statutory holidays. At present the on call technologist handles all urgent ultrasounds.

On call, VENOUS/ ARTERIAL ARM Doppler studies, VENOUS/ ARTERIAL NECK Doppler studies and ARTERIAL LEG Doppler studies are done by the vascular lab. The referring service should contact the attending on-call for echocardiography or vascular ultrasound (Vascular lab) for such studies. Medical Imaging performs VENOUS LEG Doppler studies.

4. GI/GU studies

For gastrointestinal contrast studies and cystograms, contact the on-call general radiology staff for back up.

5. Joint aspirations and lumbar puncture

Joint aspiration service provided only if an MSK Radiologist is on call. If there is no MSK Staff on call, this service is not provided on call.

LP referrals covered by the Neuro radiologists

6. Plain films

For plain films other than spine, contact the General staff on call for back-up. For spine x-rays please contact the Neuroradiologist.

7. Neuroimaging

Contact Neuro fellow or staff on call for back-up.

Please note that in general Neuro MRI protocols need to be discussed with the Neuro fellow/staff and approved before arranging a study. Exceptions are cord compression or surgical planning MRIs which the residents can approve on their own. Feel free to call the fellow/staff if you need advice. Make sure there are no contraindications to MRI before

arranging the study and also make sure the requesting physician fills out a paper requisition and orders the study on Soarian.

8. MRI: Current hours of MRI operation:

- 16 hours/day Monday through Friday 7:00 AM -11:00 PM.
- Saturday and Sunday 8:00 AM to 8:00 PM.

A technologist is on call for those times when MRI is closed.

If an urgent MR is needed outside of regular operating hours page the technologist on call at 416-685-9529.

Please note: It occasionally happens that pages don't get through to the person being paged (if, for example, they're in a dead zone – there are many of these in the hospital and around the city). If you page the technologist and they do not answer after 10 minutes or so, try a second page. If there is still no response, page the team leader at 416-685-9073.

Here are links for the MRI Requisition and screening forms

<http://smhinet/Intranet/pdf/MRI/screeningform.pdf>

<http://smhinet/Intranet/pdf/MRI/20040615MRIREQ.pdf>

9. VIR and INR procedures: **Direct referral to the VIR or INR radiologist.**

We recognize that residents are often busy elsewhere in the department at the time procedures are being done; we do, however, encourage you to make every effort to find the time to assist in VIR and INR procedures whenever possible.

We do not accept referrals of patients from other hospitals after regular work hours if those patients are to be transferred back to the original hospital (e.g., we will not insert an IVC filter on a patient from TEGH and then send the patient back to TEGH). The only way we will manage patients from other hospitals on call is if they are being transferred to SMH – in this setting, the referral to SMH VIR or INR must be made by the SMH staff physician who will be taking over the care of the patient (and not the physician from the originating hospital).

Occasionally, the Emergency Department needs to arrange next working day procedures for semi-urgent problems. Under these circumstances, please jot down the necessary information and pass it along to the VIR service in the morning.

Requests for a PICC, central venous access or dialysis catheters are not entertained on call or on the weekends.

c. PROBLEMS ON CALL

Sooner or later you'll have a problem on call...

- If you're asked to do something that you think is blatantly wrong or contraindicated, contact the relevant staff on call before doing anything (including refusing the request).
- If you get your arm twisted into doing a study that you think didn't need to be done urgently, for example, then please make note of the details and pass the information on to a staff member the following day.
- If you run into other problems that you think need to be addressed, please let us know about them so that if at all possible we can deal with them in a constructive manner.

We can't fix problems if we don't know about them.

4. TAKING TIME OFF

A. Vacation

- Residents are entitled to 4 weeks of vacation each year (as well as 7 week days of conference time and 2 stat days).
- You must obtain prior approval of our rotation supervisor and the hospital chief resident before taking time off.
- Once approval has been obtained, the hospital chief resident must document the holiday on the resident call schedule.
- The hospital chief resident will also confirm approval of the holiday by notifying (email) the resident who made the request, rotation supervisor, site coordinator, Ayethida and Bev Penny.
- Bev Penny will keep a list of vacation requests for St. Michael's residents.
- For more information on the PAIRO contract please see www.pairo.org.
- Information about booking holidays is also on the resident website (www.utradiology.com [Login: Resident, Password: X-ray]) where a list of holidays is also kept.

B. Sick days

- If a resident is ill they should notify hospital chief resident, site coordinator, rotation supervisor and Bev Penny at 416-864-5692 or pennyb@smh.toronto.on.ca

C. Appointments

- Time off for appointments is up to the judgement of the rotation supervisor and site coordinator. These are not recorded and there are no specific guidelines.

D. Lieu days

- There is a PAIRO contractual obligation to allow a lieu day if a resident works on a statutory holiday (or any part thereof, including being on call the day before, usually the Monday of a long weekend).

5. ST. MICHAEL'S RADIOLOGISTS

St. Michael's Hospital

30 Bond Street
Toronto, Ontario M5B 1W8 Canada

Phone: (416) 864-5656
Fax: (416) 864-5380

Chung, Dae-Gyun	Lecturer	Body Imaging
Common, Andrew	Assistant Professor Radiologist-in-Chief	Vascular/Interventional
Deitel, Wayne	Assistant Professor	Body Imaging
Dowdell, Timothy	Associate Professor Undergraduate Program Director	Musculoskeletal Imaging Body Imaging
Goldberg, Franklin	Assistant Professor	Breast Imaging Abdominal Imaging
Gray, Bruce	Assistant Professor	Nuclear Medicine Neuroradiology
Hurwitz, Gilbert	Associate Professor	Nuclear Medicine
Lata, Andrew	Assistant Professor	Body Imaging
Marcuzzi, Dan	Assistant Professor	Vascular/Interventional, Ultrasound
Marotta, Thomas	Assistant Professor	Neuroradiology
Montanera, Walter	Associate Professor	Neuroradiology
Muradali, Derek	Associate Professor	Body Imaging Breast Imaging
Noel de Tilly, Lyne	Assistant Professor	Neuroradiology
Pearce, Dawn	Lecturer	Musculoskeletal Imaging
Prabhudesai, Vikram	Assistant Professor	Vascular and Interventional Imaging
Sarma, Dipanka	Assistant Professor	Neuroradiology
Weiser, William	Professor	Chest
Wu, Louis	Assistant Professor	Abdominal Imaging
Zalev, Arthur	Assistant Professor	Gastrointestinal

	Radiologists	Pagers	Locals
1.	Dr. D. Chung	685-9971	5682
2.	Dr. A. Common	685-9595	5680
3.	Dr. W. Deitel	685-9676	3075
4.	Dr. T. Dowdell	685-9964	5690
5.	Dr. F. Goldberg	685-9965	6474
6.	Dr. B. Gray	685-9955	5792
7.	Dr. G. Hurwitz	685-9135	5685
8.	Dr. A. Lata	685-9583	5883
9.	Dr. D. Marcuzzi	685-9966	5681
10.	Dr. T. Marotta	685-5547	5675
11.	Dr. W. Montanera	685-9407	5671
12.	Dr. D. Muradali	685-9692	5652
13.	Dr. L. Noel de Tilly	685-9611	5674
14.	Dr. D. Pearce	685-9587	6328
15.	Dr. V. Prabhudesai	685-9956	6702
16.	Dr. D. Sarma	685-5198	5029
17.	Dr. W. Weiser	685-9580	5672
18.	Dr. L. Wu	685-9969	6497
19.	Dr. A. Zalev	685-9589	5740

6. DEPARTMENTAL TELEPHONE LISTING

Revised February 12, 2008

Main Department		Personnel		
		Name	Phone	BB
Front Office	5656			
Front Office Fax	864-3019	Thomas U	5653	9226
Bookings	864-5657	Shairoz Kherani	2565	9295
Steno Pool Rm. 100	2771	Paul O'Meara	5655	9450
Classroom Rm. 3-072 CC	6473	Yun Liu	5654	
Lounge	1736	Bev Penny	5692	
Central Reporting	2390/2391	Bev Fax	5380	
Neuro Reporting	6132	Team Leaders		
Chest Reporting	6538	Chris	5691	9208
Mammo Reporting	2109	Catherine	5829	9737
Bone Reporting	4108	Terry	6029	9421
Chest Rm.	6498	Steve	6112	9739
General Rms.	6455	Mahari	6269	9995
IVP Rm.	6368	Pat	5177	9805
Specials Rm. (Philips)	6281	Mario	5876	9073
Specials Rm. (Polystar)	6280	George	2884	9801
Technical Control	5658	RIS/PACS		
Film Library	5662/2866			
Film Library Fax	864-5468	Dan Pharand	2943	9100
Reports	5664	Christian Moran	6335	9927
		Martin Kepa	3133	4409
Specialties				
Angio/Interventional	5886	Hao Tran	3285	9435
Angio/Neuro	6254	Irene Silva	2113	9355
Angio Bookings	6596	Radiologists		
Angio Reporting	3529	Dr. Chung	5682	9971
CT Rm. 1	5663	Dr. Common	5680	9595
CT Rm. 2	3586	Dr. Deitel	3075	9676
Mammo Tech Rm	2577	Dr. Dowdell	5690	9964
Mammo Reporting	2183	Dr. Goldberg	6474	9965
MRI Techs	2134	Dr. Gray	5792	9955
MRI Bookings	5661	Dr. Hurwitz	5685	9135
MRI Reporting	6103/6160	Dr. Lata	5883	9583
Nuc Med Reporting	4116	Dr. Marcuzzi	5681	9966
Nuclear Medicine	5115	Dr. Marotta	5675	5547
Ultrasound	5885	Dr. Montanera	5671	9407
Ultrasound Reporting	5799	Dr. Muradali	5652	9692
		Dr. Noel de Tilly	5674	9611
Satellite Areas				
Emerg Major BB 0241	2225	Dr. Pearce	6328	9587
Emerg Minor BB 0233	2844	Dr. Prabhudesai	6702	9956
Fracture Clinic (x-ray)	2345	Dr. Sarma	5029	5198
PAF	2187	Dr. Weiser	5672	9580
Martin Centre (x-ray)	2345/2855	Dr. Wu	6497	9969
Litho	6357	Dr. Zalev	5740	9589
Cysto	2196			
4V Darkroom	6146	Radiology Resident On-Call BB 0209		

7. WORKING IN THE DEPARTMENT

The departmental working hours are 8:00am-5:00pm. If there are no morning rounds you are expected to start reporting at 8:00am. Please be punctual. It is good practice to bring your snack/lunch for rounds and go back on service as soon as the rounds are over.

The following are guidelines regarding case numbers for an average resident. Obviously you will get faster as you progress through your training. It is expected that the residents are part of the 'team'; so please sit in the appropriate service area. For example when in CT/Body look at cases in the CT reporting room, when in US review and report cases in the US reporting area. If there are any issues contact VP.

1. NEURORADIOLOGY:

- PGY2:** 20 CTs (50% ER CTs, 50% non ER CTs including mix of heads, spines, necks, sinuses, orbits, CTA, CTV)
2 MRIs (one head, one spine)
10-20 plain films (spine) weekly
Should learn and master LPs
- PGY3-5:** 20 CTs (same as junior resident)
15 MRIs (~ 50% head-including MRAs, ~50% spine)
10-20 plain films (spine) weekly
Should master LPs

Other responsibilities: protocol CT requisitions; provide written or verbal preliminary report of emergency cases done during working hours.

2. BODY & CROSS SECTIONAL CT:

The idea is to be part of the service and be involved with protocoling & monitoring of cases and be available for when the fellows are reviewing ER/inpatient cases with Staff. Learn how to deal with contrast reactions.

- PGY2:** Target 10-15 scans a day. (Mix of cases; some simple and some complex)
- PGY3-5:** Target 15-20 cases.

3. CHEST:

Please discuss with Dr Weiser regarding volume and type of work.

4. ER/MSK:

- PGY2:** The target is to report around 100 cases every day. In addition learn and master joint injections and aspirations.
- PGY3-5:** As above or target around 15 MSK MRs.

5. US:

Please discuss with Dr Muradali.

8. ROTATION SPECIFIC GOALS & OBJECTIVES

1. BREAST IMAGING

The residents will gain basic knowledge, technical skills and attitudes necessary for Breast imaging including:

- Supervision and interpretation of mammograms
- Diagnostic Breast Ultrasound
- Interventional procedures: Core biopsy, aspirations, galactography, and needle localization.
- Basic understanding of breast MRI

2. CHEST RADIOLOGY

- The orientation of the thoracic imaging rotation at St. Michael's Hospital is geared to junior residents at the R1/R2 levels. The thoracic imaging rotation will include the following areas:
 - Plain chest radiography.
 - ICU and Emergency chest radiology.
 - CT imaging of the thorax.
 - Plain film cardiovascular radiology.
- In all these, emphasis will be placed on anatomic radiological correlation and on clinical radiological correlation. Residents will be encouraged to develop a sound knowledge of the common thoracic diseases for which imaging is done. Development of clinically oriented and practical differential diagnoses will be encouraged in this rotation.
- The orientation of this rotation is towards physiological and functional imaging interpretation. Undue emphasis will not be given to pattern recognition; rather the underlying pathophysiological changes leading to these patterns will be emphasized.
- The residents will have one or more daily read-out sessions with the staff radiologist on thoracic imaging. The residents will be encouraged to read as many cases as they are able in order to accrue maximum benefit from this rotation.
- The principles of plain film Cardiovascular Radiology as well as Intensive Care Unit and Emergency radiology will be covered in this rotation. The residents will be made aware of the common thoracic interventional procedures available and their indications, contraindications and complications.
- For residents having a month's rotation, preparation of a teaching round on a thoracic imaging topic will be encouraged to be presented to the residents and staff and elective students in the department.

3. CT

- Knowledge of the technical aspects of CT including use of oral and IV contrast
- Knowledge of cross-sectional anatomy
- Practical experience in supervision including vetting requests, protocoling the examination, post-processing and reporting of examinations.
- Know common indications for CT scans with emphasis on Emergency scans
- Be able to recognize common abnormalities on CT scans (including artifacts), and describe these abnormalities and formulate reasonable differential diagnosis and recommendations for further investigations, if appropriate.
- Management of contrast reactions.

4. GI/GU IMAGING

- Indication, performance and interpretation of gastrointestinal and urological examinations.
 - Various barium preparations and their uses.
 - Indications and contraindications for barium in emergent cases
- Knowledge of anatomy of the GI/GU tract as related to plain radiographs, CT, US, MRI and contrast studies of the GI/GU tract
- Interpretation of abdominal radiographs
- Satisfactory venipuncture skills.
- Competent operation of fluoroscopic equipment.
- Knowledge of radiation safety
- Ability to formulate appropriate reports on plain films, contrast studies, fluoroscopic examinations and CTs.

5. MRI

- Knowledge of MR physics and use of contrast media.
- Understanding of current practice with regards to MR safety
- Knowledge of sectional anatomy

- Practical experience in supervision including vetting requests, protocoling the examination, post-processing and reporting of examinations.
- Be familiar with the appearance of common abnormalities including artefacts.

6. MSK

To know the basic anatomy and to learn the technical skills and attitudes necessary for performance of basic musculoskeletal imaging including:

- Plain film interpretation of bones, joints and soft tissues
- CT of bones, joints and soft tissues
- MRI of bones, joints and soft tissues
- Arthrography (standard, CT, MRI) and joint injections - indication, basic procedural skills, basic interpretation
- Musculoskeletal ultrasound – indication and interpretation
- Interventional – Fluoroscopic, CT guided bone biopsies; US or CT guided soft tissue biopsies; Fluoroscopic or US-guided joint, bursal or tendon sheath injections.

7. NEURORADIOLOGY

- Basic knowledge, technical skills and attitudes necessary for the competent performance of diagnostic Neuroradiology
- Plain film examinations of the skull, facial bones, thoracic and lumbar spine
- CT of the brain, head and neck, and spine
- MRI of the brain, head and neck, and spine
- Technique of lumbar myelography

8. NUCLEAR MEDICINE

- To expose the resident to a wide variety of nuclear imaging and quantitative studies.
- To understand the mechanisms of localization of radiopharmaceuticals.
- Become relatively competent in the interpretation of nuclear scans of common disorders.
- To understand the differences between the various diagnostic imaging modalities, knowing when and how nuclear medicine will provide significant additional information in clinical and research applications.
- To understand the general principles of nuclear imaging instrumentation, survey meters and computerized imaging.
- To understand and apply the principles of radiation safety applied to radioisotopes, including relative dosimetry of various techniques as compared with radiography, and to apply the ALARA principle.
- To demonstrate knowledge of Radiopharmaceuticals: Production, generators, decay, emission and detection, quality control, pharmacokinetics, regulations, etc.
- To learn the therapeutic use of radio nuclides.
- To demonstrate some familiarity with the principles of PET.
- To correlated findings on Nuclear Medicine imaging with other imaging studies and provided clinical information.

9. ULTRASOUND

- Knowledge of the technical aspects of US relevant to optimize image quality
- Knowledge of cross-sectional anatomy
- To perform and report various examinations

10. VIR

- Understanding indications, contraindications and therapeutic or management alternatives to invasive radiological procedures.
- Familiarity with complications of interventional procedures.
- The procedural skills expected from a resident includes
 - Venous access
 - Image-guided biopsies
 - Arterial punctures
- The resident will have a meeting with the supervisor at the beginning of and in the middle of the rotation.