



# UNIVERSITY *of* MARYLAND MEDICAL CENTER

## Guide to The Radiology Department

Henal Motiwala, MD

Ghada Issa, MD

Jade Wong, MD ([jwong@umm.edu](mailto:jwong@umm.edu))

Pre-Test





# Objectives



Radiology location and schedule/coverage



Implications of choosing an imaging study priority



Appropriate indications and contrast agents



Introduction to contrast media (i.e. allergy to contrast, and contrast administration in kidney function)



Introduction to MRI safety

# Guide to Radiology

Locations

Schedule  
and coverage

Ordering a  
study

Contrast  
agents

MR safety

Priority

Indication

Protocol

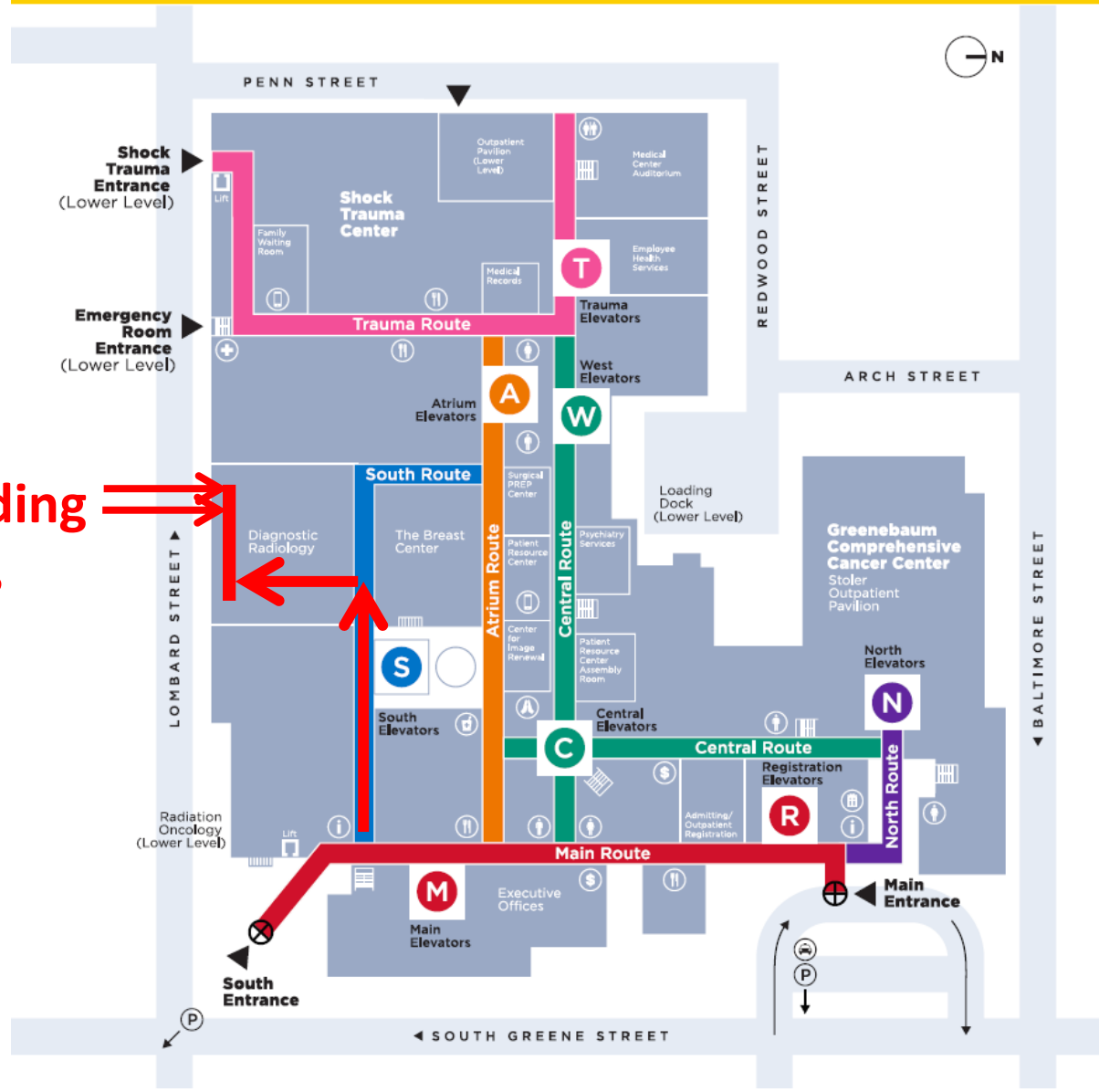
<b>Floor</b>	<b>Weinberg</b>	<b>Gudelsky</b>
Ground	ER CT /Xray/US	-
1 <sup>st</sup>	<b>Main Radiology</b> Breast Center NIR/VIR	-
2 <sup>nd</sup>	-	Nuc Med

# LOCATIONS



# First Floor Map

Main reading rooms



# SCHEDULE & COVERAGE

## On-Call Contacts

- Radiology
  - ED: x8-9256, #1
  - Trauma: x8-8843, #1
- Nuc Med
  - Page 4198
- IR resident/fellow
  - Page 0015
  - (Do not TC official consults!)

	In-House	Home Call
Resident	24/7 x 365 days	-
Attending	M-F 8am-5pm ED/Trauma Attending	Evenings, weekends

# ON-CALL REPORTS

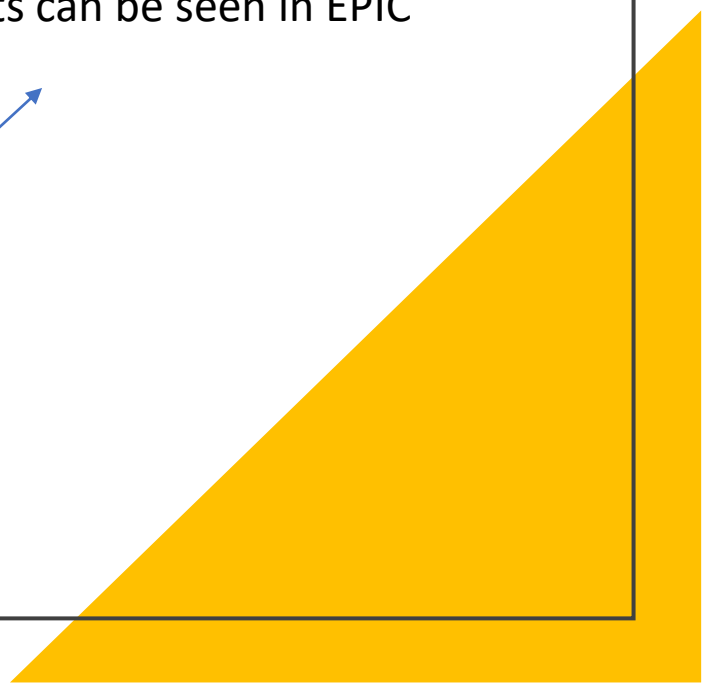
## FINAL REPORTS

- CT & radiographs
- Trauma
- Peds CT heads

## “PRELIM” REPORTS

- ED US, MR\*
- Peds ED
- All STAT IP

All reports can be seen in EPIC





# CHOOSING STUDY PRIORITY

**STAT:** *from the Latin word “Statum”, meaning ‘immediately’*

- Highest priority for life threatening conditions (such as BAT, cardiovascular emergencies, intraop instrument count; any study from shock trauma and ED)

**ASAP:** As soon as possible, study to be performed at the earliest opportunity, after the STAT studies

**Routine:** performed after STAT and ASAP, within 1 shift

\*If your patient’s clinical status changes at any time and you think the study should be prioritized, please call the tech or the corresponding reading room and let us know!!

# ORDERING A STUDY

- Indication: **signs & symptoms**
- Body part(s)
- Laterality when applicable
- Allergies for CT/MR
- Additional history/study comments: kidney function, dialysis status, ability to tolerate PO contrast, status post surgery etc..)
- Call back number or contact on Tiger Connect (individual or team)!



## STUDY INDICATION

- Signs, symptoms, labs (the reason for study)
- “Evaluate for,” “Concern for,” “Rule out,” “s/p anything” are NOT enough. Good to include but AFTER signs and symptoms



# ORDERING A STUDY

Reason for Exam	Items to include or consider
Tube Placement	What kind of tube: ETT, NG, Post Pyloric, Chest Tube, etc. New insertion to check placement, repositioning, chest tube to water seal etc..
Respiratory	SOB, hypoxia, respiratory failure are OK. Additional symptoms like cough, wheezing, generalized edema, fever are helpful if applicable
Cardiac	Chest pain is OK but with additional descriptors such as location
Abdomen	Signs and symptoms such as pain, tenderness, distention.. If pain: add location and type
Pain	By itself is NOT ok. We need additional information such as location, trauma related, duration, or other pertinent information
Fall	By itself is NOT ok . We need additional information such as change in mental status, extremity pain after fall..
Fractures	Must have location or laterality, if trauma associated, and closed versus open. Swelling of extremity or contusion.
Motor vehicle collision Pedestrian struck Gunshot wound	May not have details initially if coming into shock trauma but as soon as possible add details or call to update

# STUDY PROTOCOL

- Almost every cross-sectional study (CT/MR) that requires contrast needs to be “protocolled” by a radiologist
  - Protocol = how a study will be acquired
  - It can be the difference between a useless/redundant study or a diagnostic one
  - Radiologist will determine need for contrast and specific phases based on clinical information
  - If you no longer want to order a study, please cancel the study ASAP and call us directly – studies have been done after the provider cancelled and it creates a lot of logistical issues

WITH OR  
WITHOUT?...  
THAT IS THE  
QUESTION

CT Abd/Pelvis WITH contrast → IV  
only

CT Abd/pelvis with PO and IV

CT Abd/Pelvis WO → no IV but  
can have PO, specify in comments

\*Radiologist may call you to get more information when protocolling study. A good call back number or pager will facilitate this communication and limits delay in patient care!



# CONTRAST AGENTS

Examples of contrast use in different clinical studies	
CT Head	Most are done WITHOUT contrast in the acute setting. Exceptions might include: history of malignancy, infection, or vascular abnormality.
MRI head	WITHOUT for stroke. WITH and WITHOUT for tumors, infections.
CT neck	Most are done WITH contrast to evaluate soft tissues.
CT chest	WITHOUT contrast when evaluating for pneumonia, pleural effusions.. WITH contrast when evaluating for malignancy, mediastinal or vascular pathology.
CT abdomen and pelvis	WITHOUT contrast when evaluating for renal stones, retroperitoneal hemorrhage. WITH IV contrast when evaluating for acute or chronic pain, vascular pathology, active bleeding, infection, malignancy. PO contrast needed for bowel pathology, and when looking for intra abdominal abscess or malignancy to better separate bowel.
CT/MR spine	WITHOUT for trauma, disc disease. WITH for infection, malignancy.

# CONTRAST AGENTS

## CT contrast:

- IV: iodine based ex. Omnipaque, Visipaque.
- PO: mostly iodine based, can use non iodine based in case of iodinated contrast allergy (Barium based)

## MR contrast:

- IV: gadolinium based ex. Multihance, Gadavist, Dotarem.
- PO: Volumen or Breeza (for MR enterography)

## US contrast:

- Microbubbles (Lumason)



# ALLERGY TO CONTRAST AGENTS

## Uncommon

- 0.6% for iodinated contrast agents (0.04% severe)
- 0.1-0.22% for gadolinium contrast agents (0.006% severe)

There is no cross reactivity between allergy to iodinated contrast medium and gadolinium-based contrast medium

Refer to ACR manual on contrast media for more information

[https://www.acr.org/-/media/ACR/Files/Clinical-Resources/Contrast\\_Media.pdf](https://www.acr.org/-/media/ACR/Files/Clinical-Resources/Contrast_Media.pdf)



# ALLERGY TO IODINATED CONTRAST MEDIA

- Allergic-like reactions
  - ICM are known to directly cause histamine release from basophils and mast cells
  - Treatment is identical to equivalent allergic reaction
  - likely independent of dose and concentration above a certain unknown threshold
  - Additives or contaminants, such as calcium-chelating substances or substances eluted from rubber stoppers

Prednisone  
50mg  
(13, 7, 1 hr)



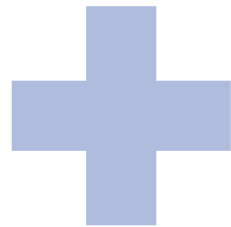
Diphenhydramine  
50mg Iv/IM  
(1 hr prior to scan)



Elective  
Pre-medication

*Or...*

Methylprednisolone  
40mg  
(q4 hr)



Diphenhydramine  
50mg Iv/IM  
(1 hr prior to scan)



Emergent  
Pre-medication

*\*\*IV steroids have not been shown to be effective when administered less than 4 to 6 hours prior to contrast injection\*\**



# “ALLERGY” TO IODINATED CONTRAST MEDIA

## *Physiologic Reactions*

- molecular attributes that lead to direct chemotoxicity, osmotoxicity
- Physiologic reactions are frequently dose and concentration dependent
- Vasovagal reactions are common
- Cardiac arrhythmias, depressed myocardial contractility, cardiogenic pulmonary edema, and seizures are very rare



# IODINATED CONTRAST RELATED NEPHROPATHY

- Ok to give IV contrast if
  - GFR  $\geq$  30ml/min
  - ESRD on HD
- Discussion required if IP status with fluctuating renal function or AKI
- PC-AKI vs CIN
- ACR Committee on Drugs and Contrast Media states “**CIN is a real, albeit rare, entity**”
- Diagnosis of AKI within 48 of IV contrast



# IODINATED CONTRAST RELATED NEPHROPATHY

- most important risk factor is pre-existing severe renal insufficiency
- GFR “threshold”: 30 mL / min/1.73m<sup>2</sup>
- Patients with anuric ESKD who do not have a functioning transplant can receive IV iodinated contrast
- Theoretical risk of converting an oliguric patient on HD to an anuric patient



## ADVERSE REACTIONS TO GAD-BASED CONTRAST

- Most reactions are mild and physiologic (coldness, warmth, or pain, N/V, headaches, paresthesia and dizziness)
- Allergic reactions are rare
- Life-threatening reactions are EXCEEDINGLY rare (0.001-0.01%)
- adverse reactions are about 8x higher in patients with a previous reaction
- NSF is extremely rare, no consent or discussion required



# ULTRASOUND CONTRAST

- Lumason<sup>®</sup> (sulfur hexafluoride lipid-type A microspheres)
- Approved uses: echo, liver imaging, peds urinary tract
- Off label: tumor assessment, endoleaks, Crohn's colitis
- injected through a moderate- or large- bore PIV
- **No renal toxicity**
- Call US reading room to discuss options!



# MRI SAFETY ZONES



© Magmedix, Inc. 2009

[www.Magmedix.com](http://www.Magmedix.com)

866-646-3349



© Magmedix, Inc. 2009

[www.Magmedix.com](http://www.Magmedix.com)

866-646-3349



© Magmedix, Inc. 2009

[www.Magmedix.com](http://www.Magmedix.com)

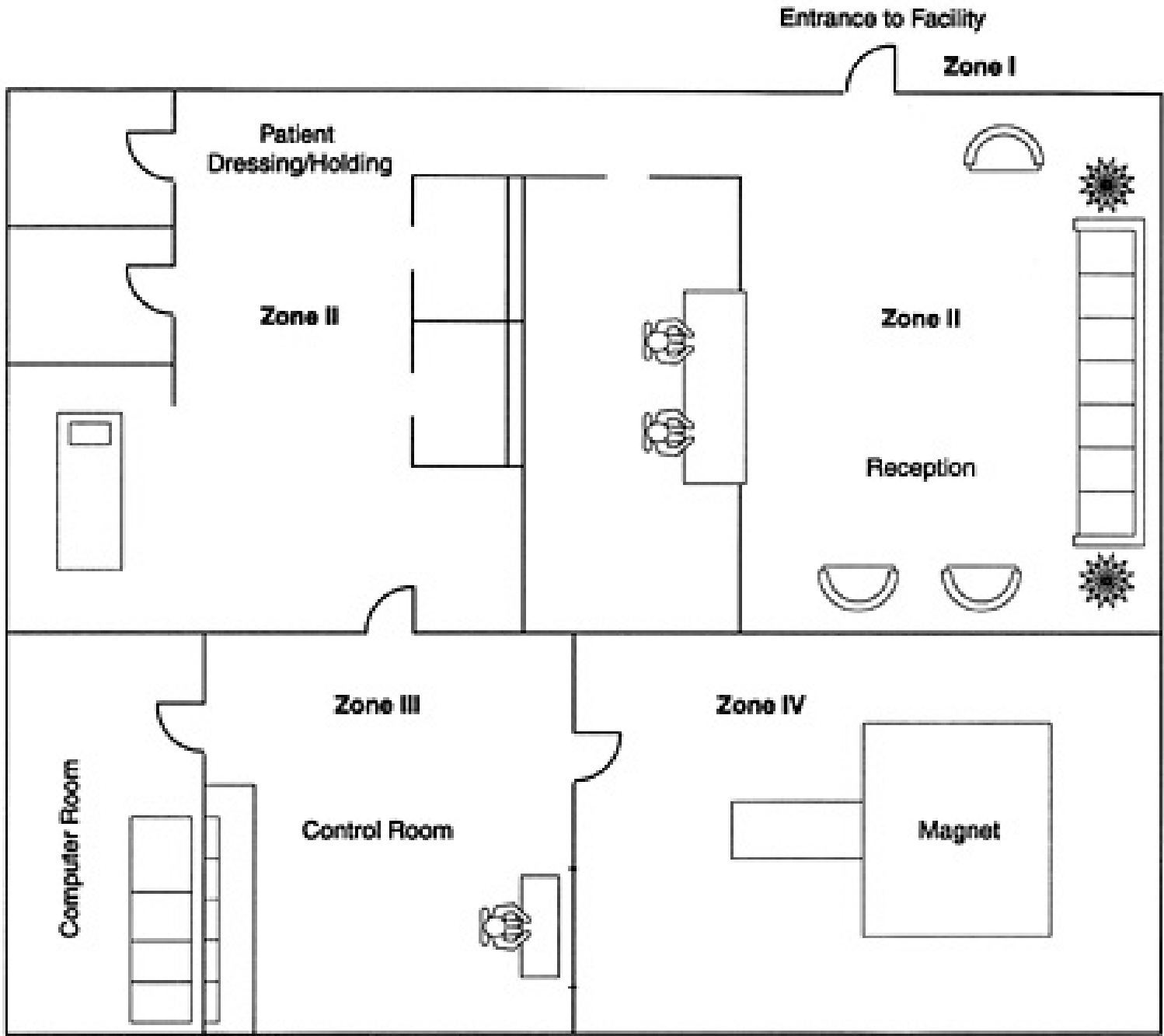
866-646-3349



© Magmedix, Inc. 2009

[www.Magmedix.com](http://www.Magmedix.com)

866-646-3349





# MRI SAFETY – Portable objects

- **MR SAFE**: an item that poses no known hazards in all MRI environments
- **MR CONDITIONAL**: an item that has been demonstrated to pose no known hazards in a specified MR environment as long as specified conditions of use are met
- **MR UNSAFE**: an item that is known to pose hazards in all MRI environments

**MR MAGNET IS ALWAYS ON!**

## Guide to radiology – Posttest

1. In which of the following scenario(s) the imaging study should be ordered STAT? Choose all that apply.
  - A pre operative chest radiograph before hip fracture repair surgery
  - A CT head for an elderly patient presenting with acute onset left hemiparesis
  - A foot radiograph for a patient status post cholecystectomy who developed first toe pain on the day of discharge
  - A chest radiograph for an outpatient with positive PPD test
2. Which one of the following indications is NOT appropriate for a chest radiograph? Choose one answer.
  - Endotracheal tube placement, check placement
  - Chest pain
  - Rule out pneumonia
  - Fever and cough
3. When a study is ordered with contrast, it means: (Choose 1 answer)
  - With intravenous contrast OR oral contrast
  - With intravenous contrast
  - With oral contrast
  - I don't know
4. After this review, and from 1 to 5, how would you rate your confidence level when ordering an imaging study when it comes to choosing the priority and/or contrast? (1 being not at all confident and 5 being very confident)
  - 1
  - 2
  - 3
  - 4
  - 5

5. There is cross reactivity between allergy to CT contrast agents (iodinated contrast) and MRI contrast agents (gadolinium-based contrast).
  - True
  - False
6. Contrast-induced nephrotoxicity is defined as acute kidney injury occurring within --- after administration of intravascular iodinated contrast medium.
  - 24 hours
  - 48 hours
  - 1 week
  - 1 month
7. You can access the area of the MRI scanner room (Zone IV) without appropriate screening when the scanner/magnet is not in use.
  - True
  - False
8. How helpful do you think this guide was?
  - Very helpful
  - Somewhat helpful
  - Not helpful

Post-Test



