
Abdominal CT Protocols

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Disclosures

- No conflicts of interest or relevant disclosures to report



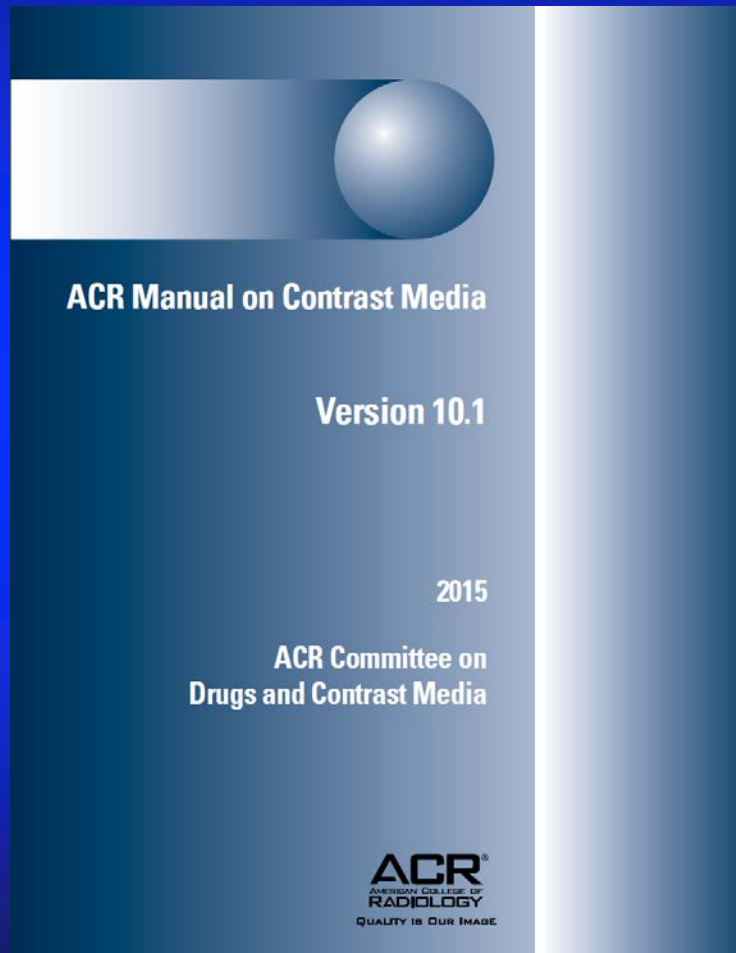
Objectives

- Review indications and contraindications for oral and intravenous contrast material
- Understand division specific abdominal CT protocols and their indications
- Learn how to accurately protocol abdominal CT using a case based approach

CT Variables

- Contrast agents (oral, intravenous, rectal, intravesicular)
- Scan timing (delay after IV injection)
- Scan range
- Reformations and post-processing

Best Resource for all things contrast



Intravenous Contrast

- Omnipaque 350 used for all abdominal CT examinations at BWH/BWFFH/DHCI
- Dosing:
 - Weight < 150 lbs: 75 ml
 - Weight ≥ 150 lbs: 100 cc



Intravenous Contrast

- Indications: any examination where contrast enhancement is useful diagnostically (ie almost every study)
- Contraindications:
 - Severe allergic like reaction (relative)
 - GFR < 30 and not on dialysis
 - Acute renal failure

Who needs pre-medication prior to IV contrast?

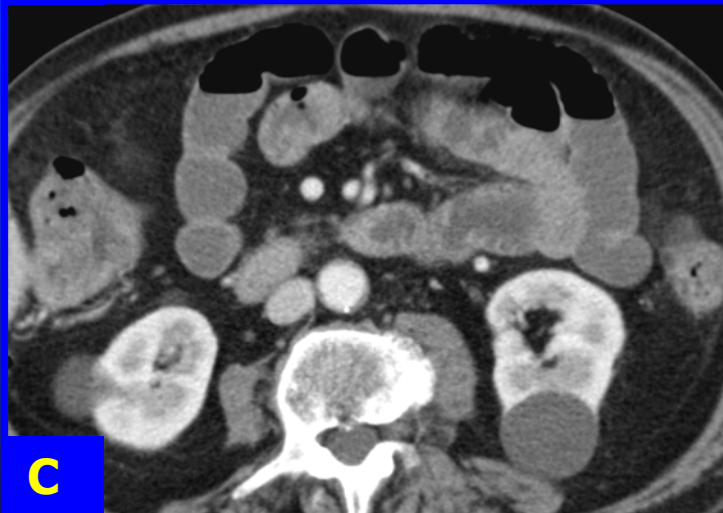
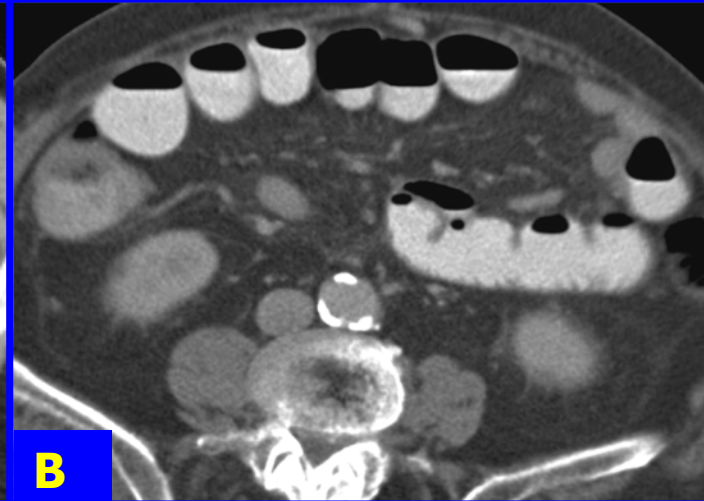
- Prior history of mild to moderate allergic like reaction to iodinated contrast
- Allergy to other substances (betadine etc) or prior physiologic reaction (vasovagal, nausea, vomiting) do not require a steroid prep
- Allergy to shellfish not an indication for prep
- In general, patients with a hx of severe reaction should be seen by allergy prior to repeat challenge of contrast

Steroid Premedication

- Outpatient Prep
 - 50 mg prednisone 13, 7, and 1 hr prior to scan and 10 mg Cetirizine 1 hr prior
- Inpatient and ER prep
 - 200 mg hydrocortisone IV 5 and 1 hr prior to scan and 50 mg diphenhydramine 1 hr prior



Enteric Contrast



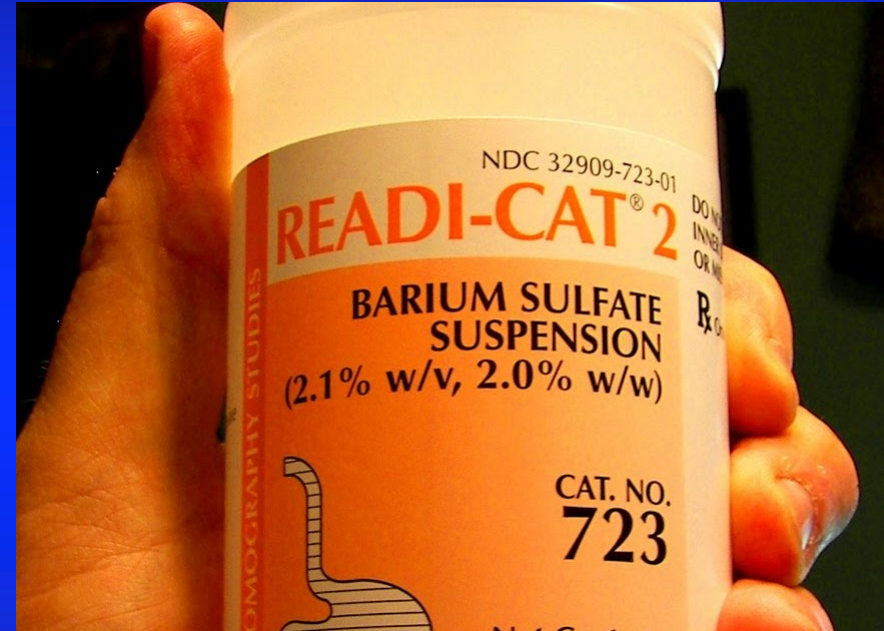
Omnipaque 240

- Preferred positive enteric contrast agent
- Indications:
 - When GI tract opacification is desired
- Contraindications:
 - Allergic like reaction to iodinated contrast
- Water soluble
- 50 ml diluted with 32 oz clear liquid



Dilute Barium (Redi-Cat)

- 2nd line agent
- Indications:
 - When GI tract opacification is desired and patient has prior allergic like reaction to iodinated contrast
- Contraindications:
 - Suspicion of GI tract perforation



Enteric Contrast

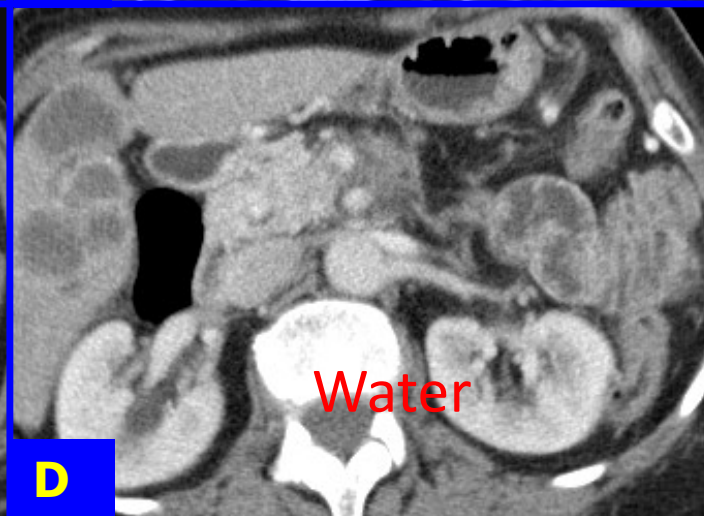
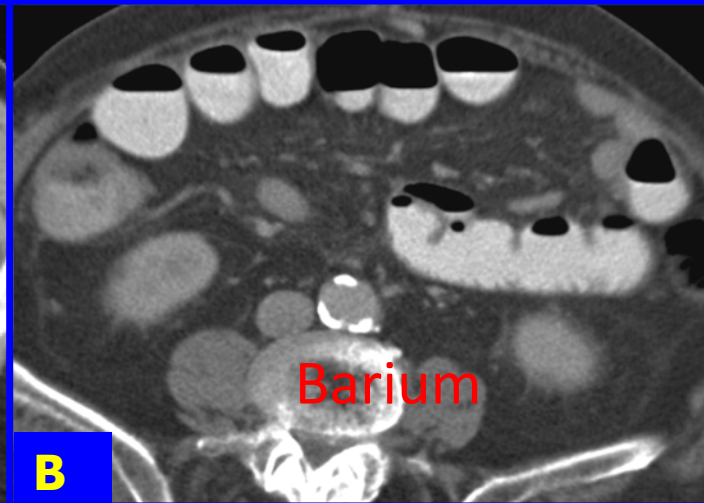
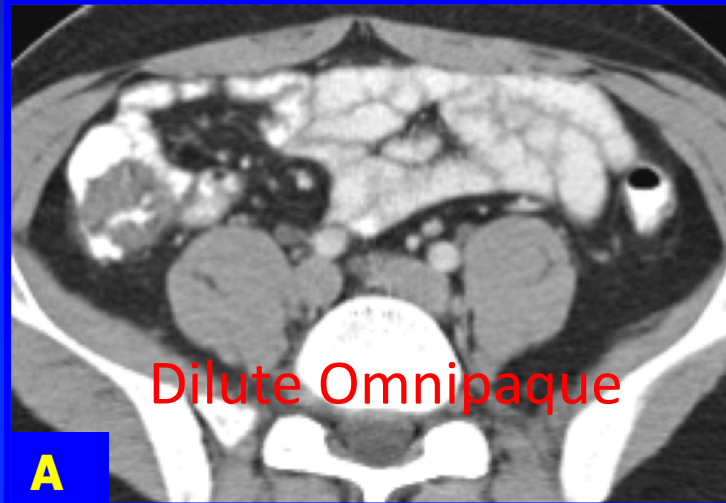
- Exceptions:
 - Breeza – enterography
 - Water – for CTU, renal mass, pancreatic mass
 - Other – colonography
 - None: stone, adrenal mass

Breeza

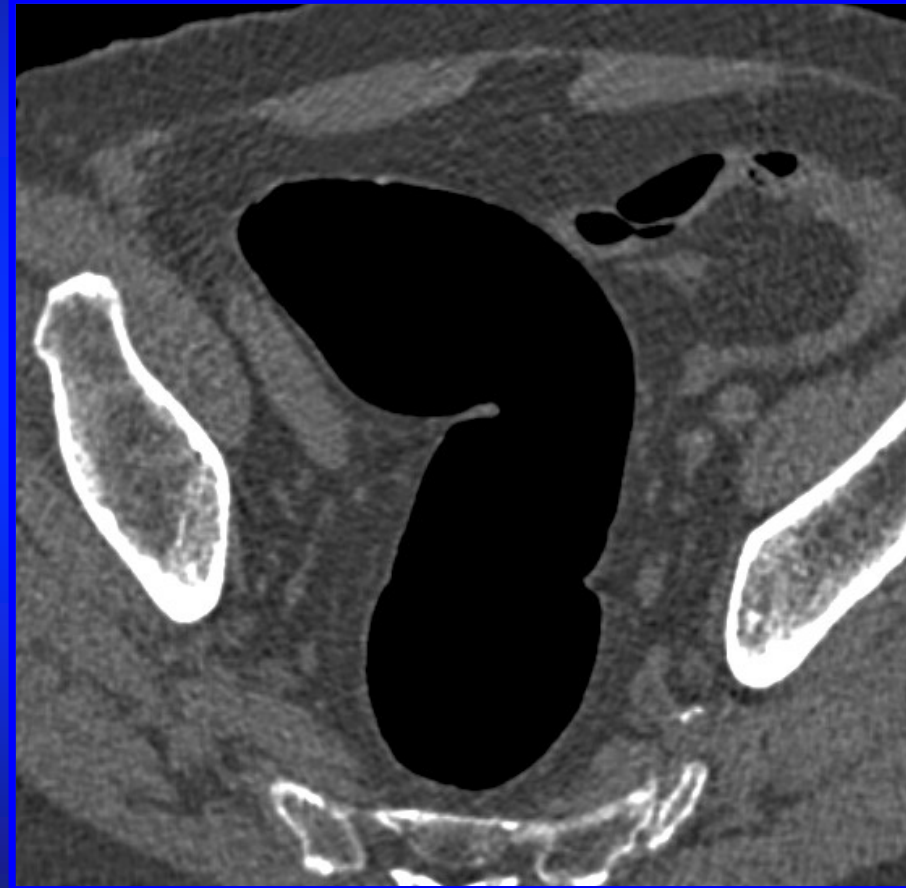
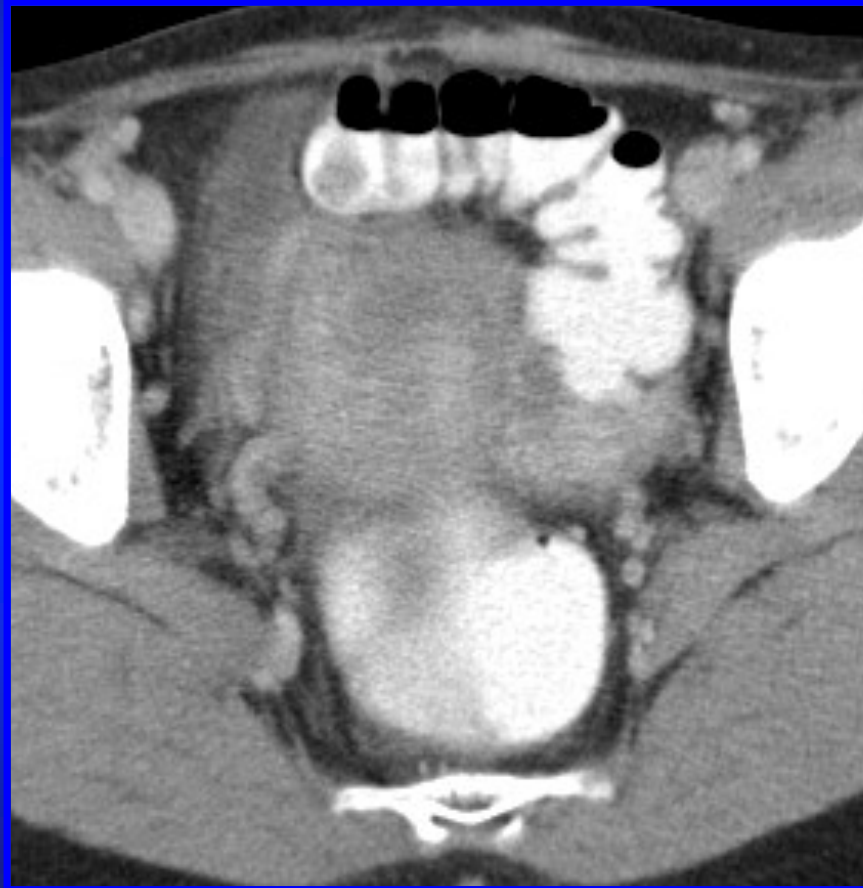
- Neutral agent – blend of water, sorbitol, mannitol
- Indications:
 - CT enterography (and MR)
- Contraindications:
 - Allergy to inactive ingredients



Which contrast?



Rectal Contrast



Rectal Contrast

Indications:

1. Post colon surgery – assess for leak
 2. Perirectal abscess/fistula (MRI preferred at BWH)
 3. Penetrating trauma
 4. Colonography
- Positive
 - Dilute Omnipaque instilled via rectal tube
 - Negative
 - Room air or CO2
 - Used exclusively for colonography



GENERAL PROTOCOLS



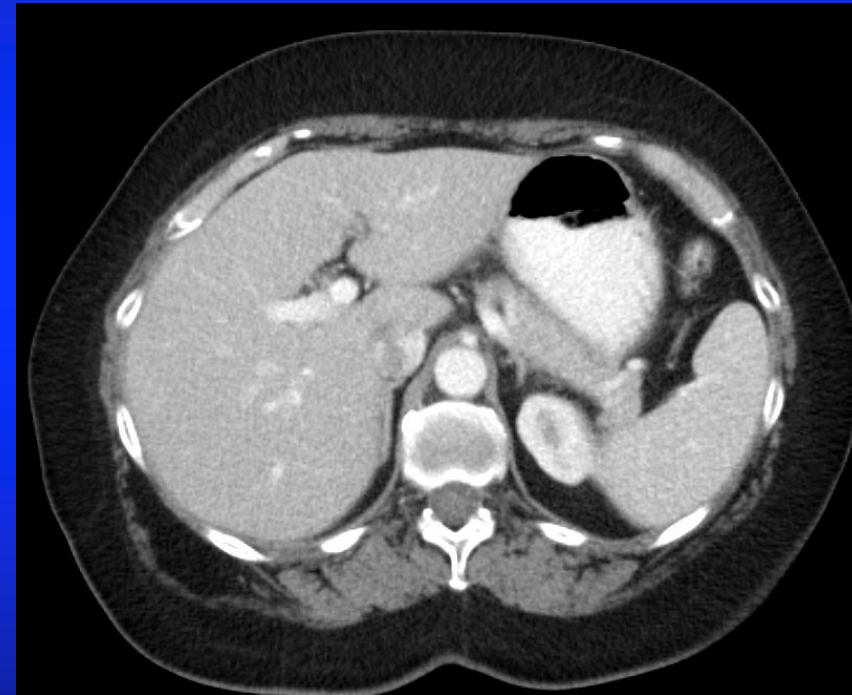
Abdomen/pelvis

- Indication: metastatic work-up of non-hypervascular tumors, weight loss, fever, pain, hemorrhage, other.
- Contrast: oral and iv
- Scan Delay: 70 seconds
- Scan FOV: abdomen/pelvis



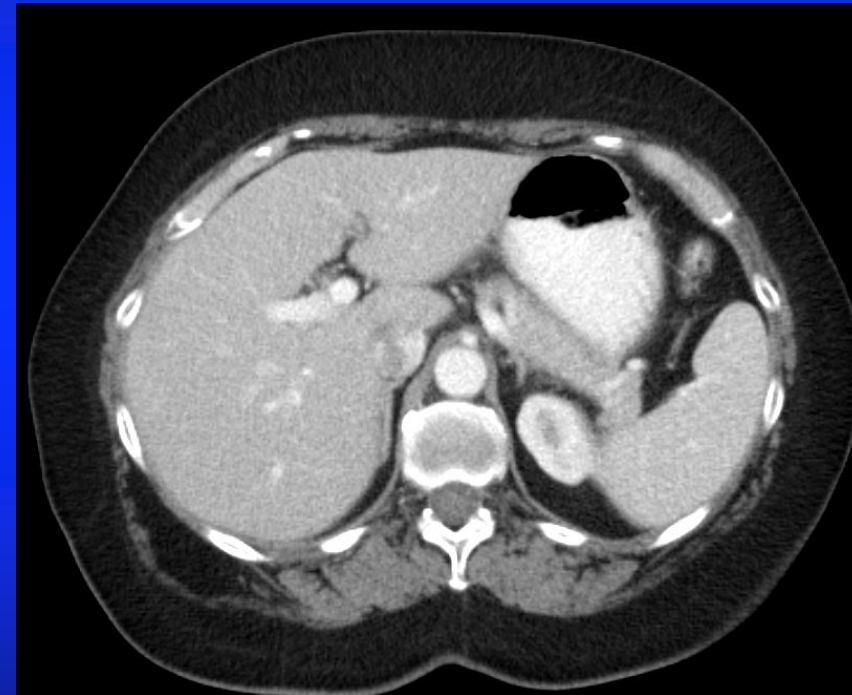
Chest/Abdomen/pelvis

- Indication: metastatic work-up of non-hypervascular tumors, weight loss, fever, pain, hemorrhage, other.
- Contrast: oral and iv
- Scan Delay: 70 second chest/abdomen/pelvis
- Scan FOV: chest/abdomen/pelvis



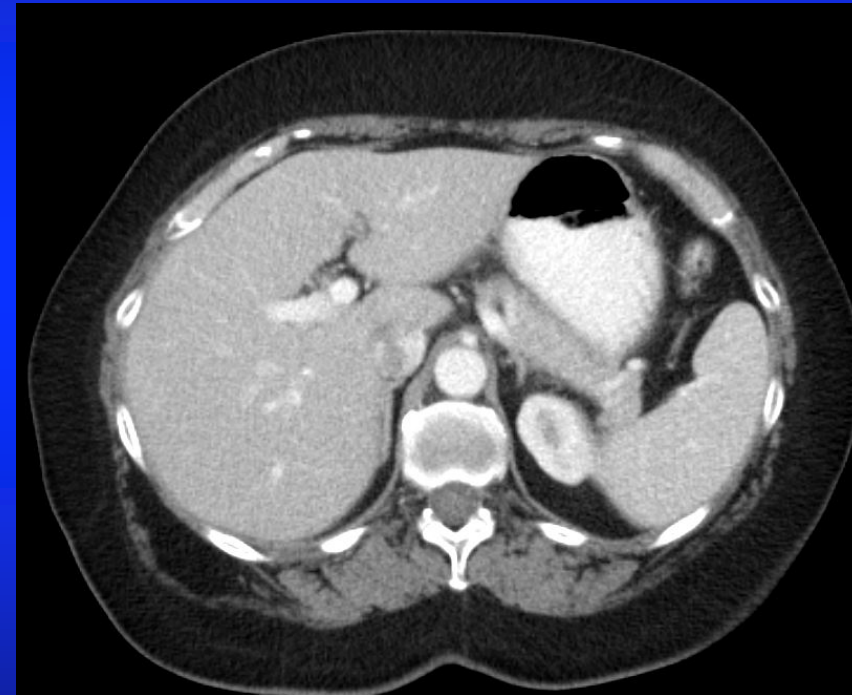
Neck/Chest/Abdomen/pelvis

- Indication: lymphoma, cancer staging, other.
- Contrast: oral and iv
- Scan Delay: 70 second chest/abdomen/pelvis, delayed neck
- Scan FOV: neck/chest/abdomen/pelvis



Chest/Abdomen

- Indication: Lung cancer staging
- Contrast: oral and iv
- Scan Delay: 30 second delay chest, 70 second abdomen/pelvis
- Scan FOV: chest/abdomen



Abdomen only

- Indication: lung cancer staging, specific request
- Contrast: oral and iv
- Scan Delay: 70 seconds
- Scan FOV: abdomen

Pelvis only

- Indication: rectal/anal abscess, other
- Contrast: iv (+/- rectal and oral)
- Scan Delay: 90 seconds
- Scan FOV: pelvis

GI PROTOCOLS



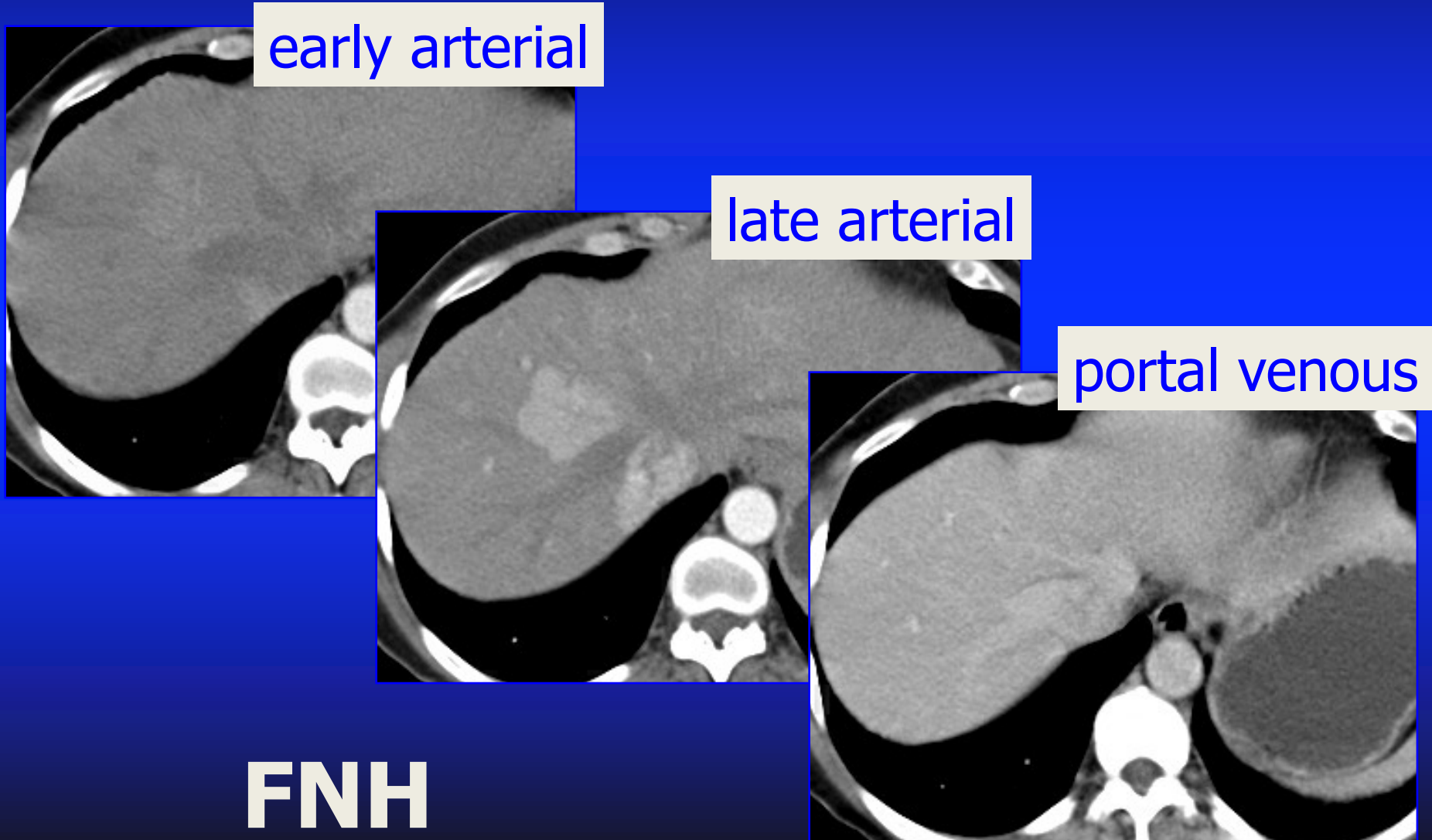
Hypervascular tumor staging

- Indication: metastatic work-up for select hypervascular tumors (**neuroendocrine tumors, HCC, RCC**), surgical planning, assessment of hepatic vascular anatomy.
- Contrast: oral and iv
- Scan Delay: late arterial liver, 70 second abdomen/pelvis
- Scan FOV: liver then abdomen/pelvis

Liver mass

- Indication: Liver mass characterization if patient unable to have MRI, post-liver ablation
- Contrast: oral and iv
- Scan Delay: non-contrast liver, late arterial liver, portal venous abdomen, 3 minute abdomen
- Scan FOV: abdomen

Three phase liver



Single Phase Enterography

- Indication: Inflammatory bowel disease
- Contrast: oral (Breeza) and iv
- Scan Delay: 70 second abdomen/pelvis
- Scan FOV: abdomen/pelvis



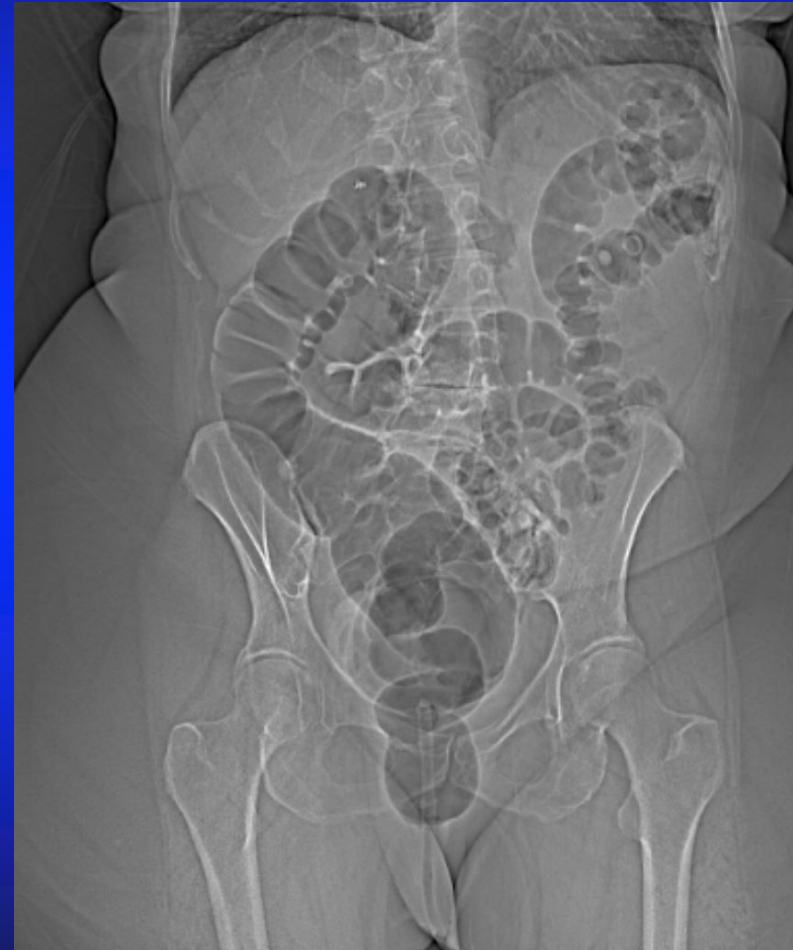
Dual Phase Enterography

- Indication: Suspected gastric or small bowel mass, occult GI bleeding.
- Contrast: oral (Breeze) and iv
- Scan Delay: 40 second and 70 second abdomen/pelvis
- Scan FOV: abdomen/pelvis



Colonography - screening

- Indication: colorectal cancer screening, asymptomatic patient
- Contrast: oral (barium and dilute omni at home day prior). No IV
- Scan Delay: n/a (patient scanned prone and supine)
- Scan FOV: abdomen/pelvis



Colonography - diagnostic

- Indication: personal history of colon polyps, blood in stool, failed colonoscopy, suspected mass, symptomatic patient
- Contrast: oral (barium and dilute omni at home day prior) and iv
- Scan Delay: non contrast prone abdomen/pelvis then 70 second supine abdomen/pelvis
- Scan FOV: abdomen/pelvis

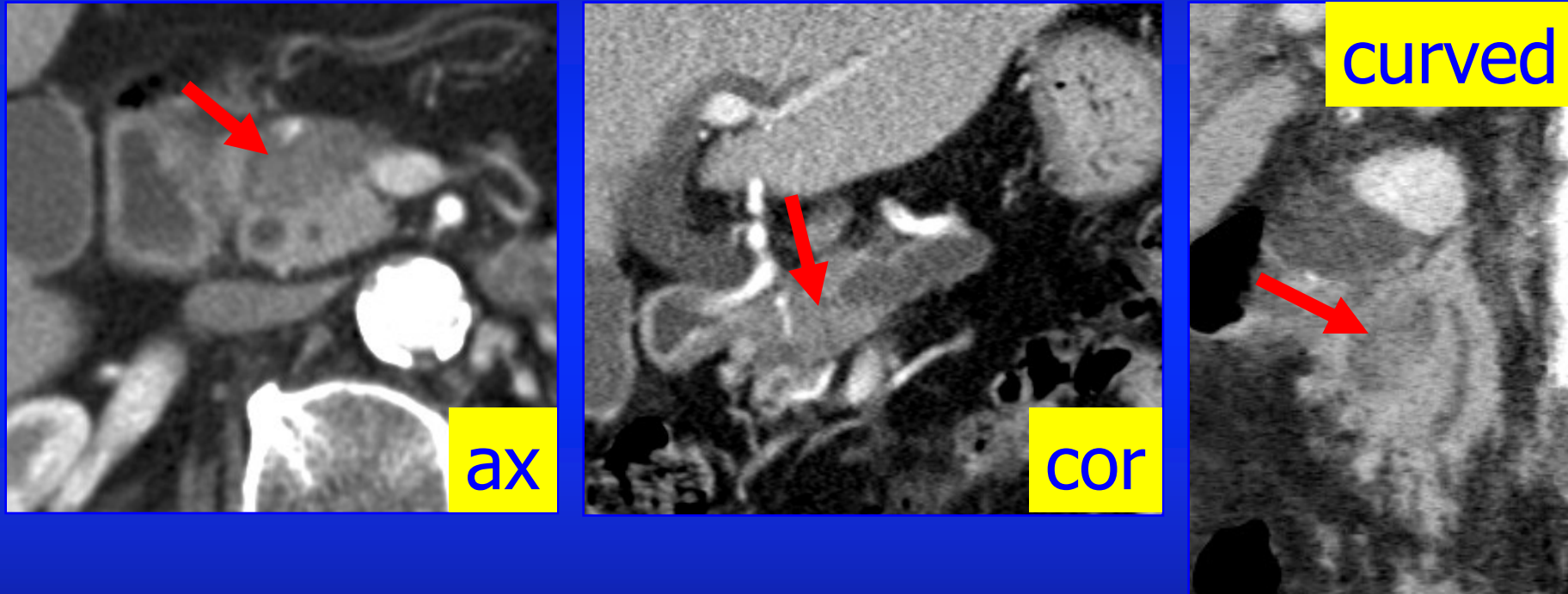
Hernia

- Indication: Suspected hernia or palpable abdominal wall mass.
BB marker placed at site of concern
- Contrast: oral and iv
- Scan Delay: 70 second abdomen/pelvis
- Scan FOV: abdomen/pelvis

Two phase pancreas

- Indication: suspected pancreatic cancer, jaundice, chronic pancreatitis, **known adenocarcinoma without metastases**
- Contrast: oral (water) and iv
- Scan Delay: 40 second pancreas, 70 second abdomen/pelvis
- Scan FOV: abdomen/pelvis

Suspected panc mass on OSH study



pancreatic adenocarcinoma

Three phase pancreas

- Indication: **Initial imaging in patients with known adenocarcinoma** or pre-operative planning prior to pancreatic resection (only use if known mass)
- Contrast: oral (water) and iv
- Scan Delay: 25 second pancreas, 40 second pancreas, 70 second abdomen/pelvis
- Scan FOV: abdomen/pelvis
- Includes 3D reformats for vessel involvement

GU PROTOCOLS



Adrenal mass

- Indication: Characterize indeterminate adrenal mass, follow-up mass for size, abnormal endocrine labs. Contrast: +/- IV
- Scan Delay: non-con then rad check
- Scan FOV: abdomen

Adrenal mass continued

- Look at non-con images:
 - If no nodule – STOP
 - In scan indication is to f/u known mass for size – STOP
 - If nodule measures ≤ 10 HU – STOP
 - If nodule contains macroscopic fat – STOP
 - If nodule measures > 10 HU or you are unsure – Do washout (60 second and 15 minute delay)

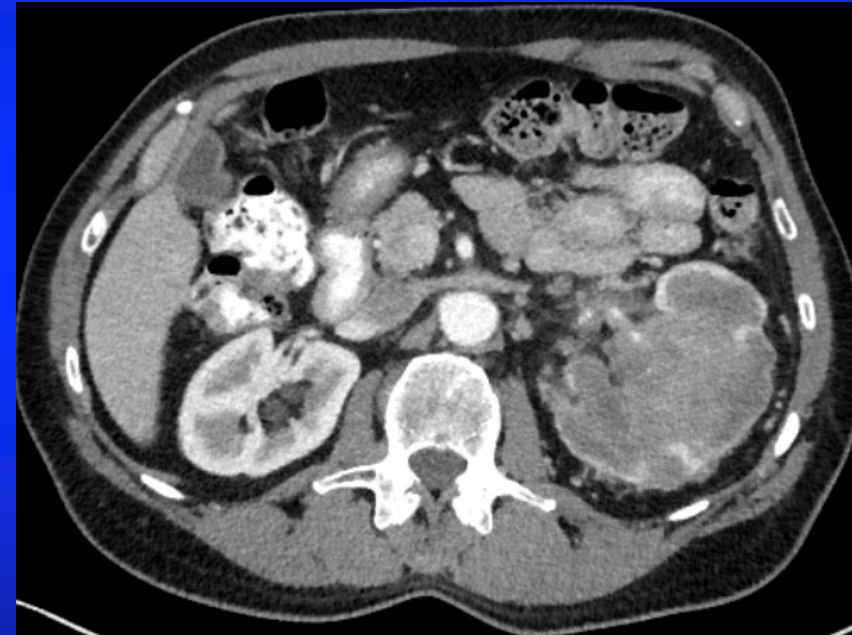
Adrenal mass continued



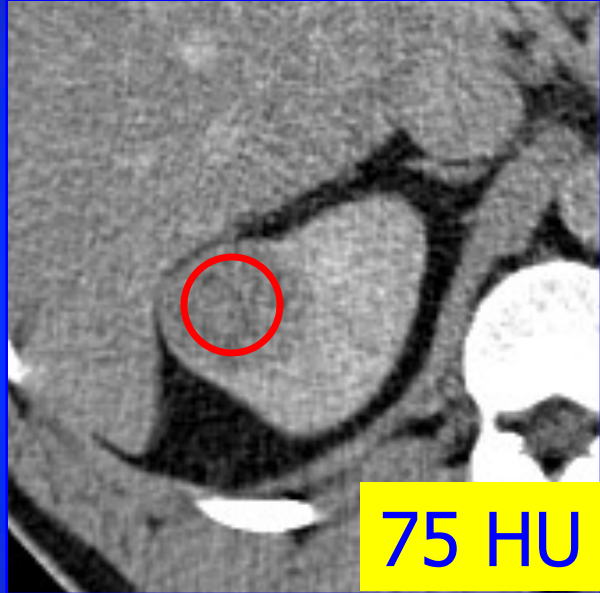
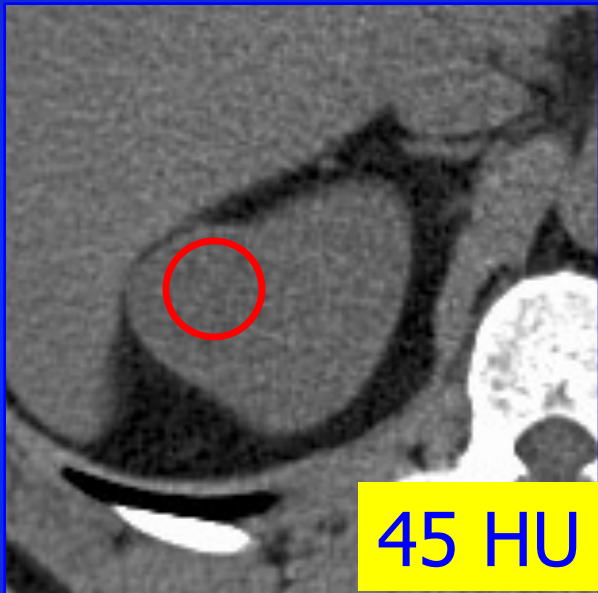
- Do you give contrast?
- What is the diagnosis?

Renal mass

- Indication: Characterize indeterminate renal mass, post-renal ablation if patient unable to have MRI
- Contrast: oral (water) and iv
- Scan Delay: non-con, 100 second, 8 minute
- Scan FOV: abdomen



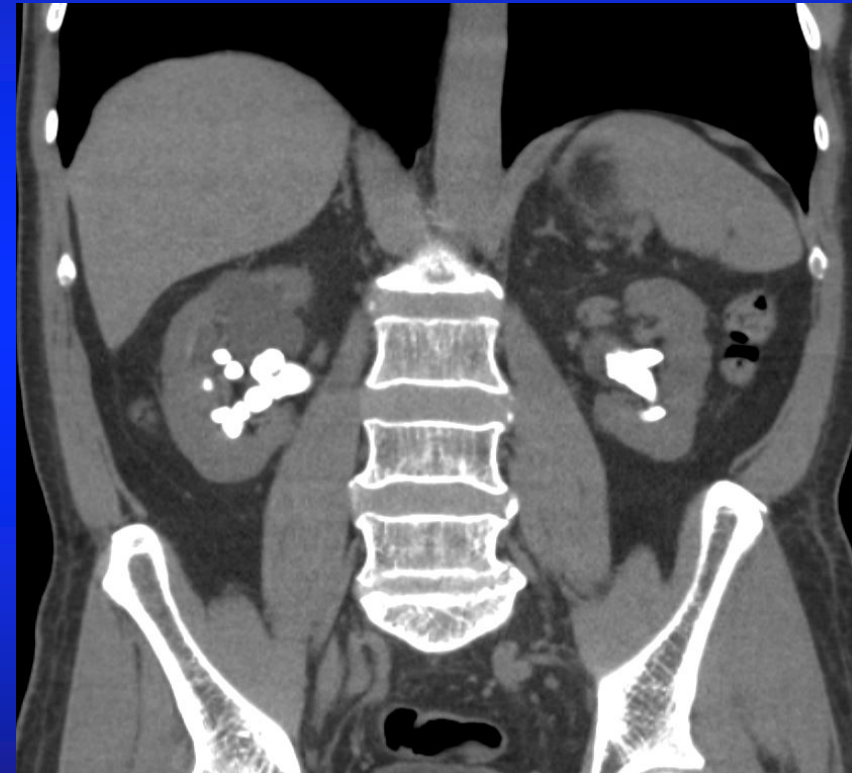
Hx of hematuria



Renal Cell Carcinoma

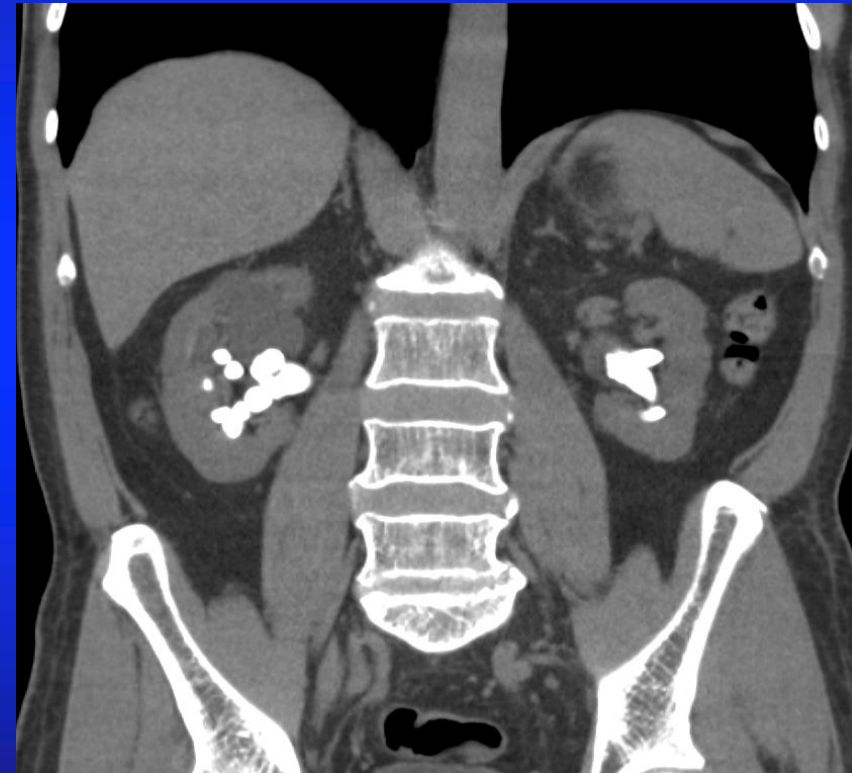
Stone

- Indication: flank pain, renal/ureteral colic, young pt with hematuria
- Contrast: None
- Scan Delay: n/a
- Scan FOV: abdomen/pelvis



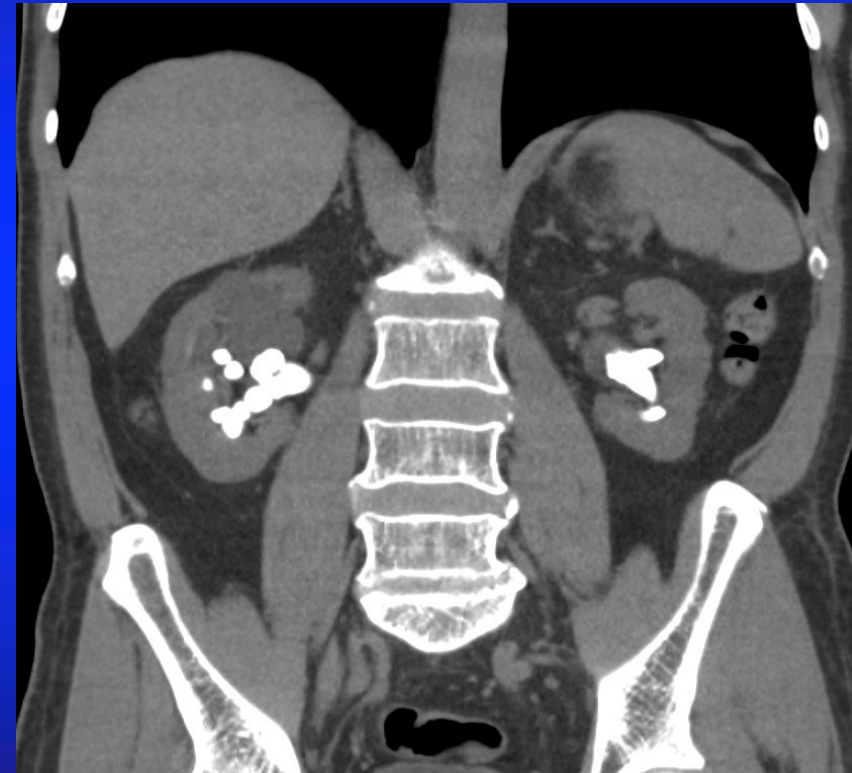
Follow-up known stone

- Indication: to assess position of known stone (not for acutely symptomatic patients)
- Contrast: None
- Scan Delay: n/a
- Scan FOV: abdomen/pelvis



Kidney only

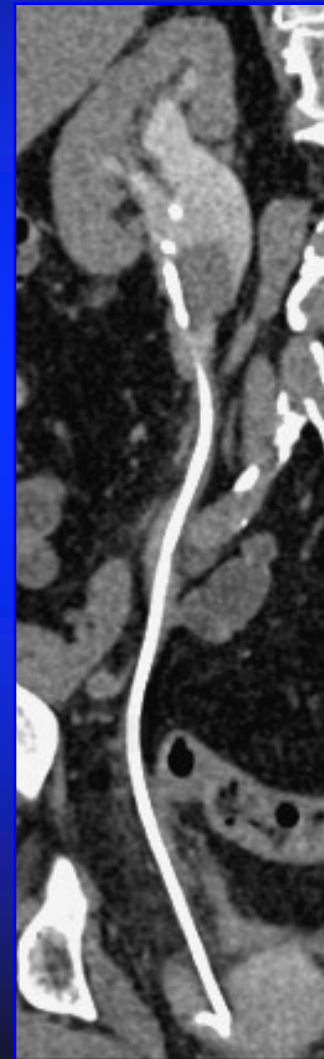
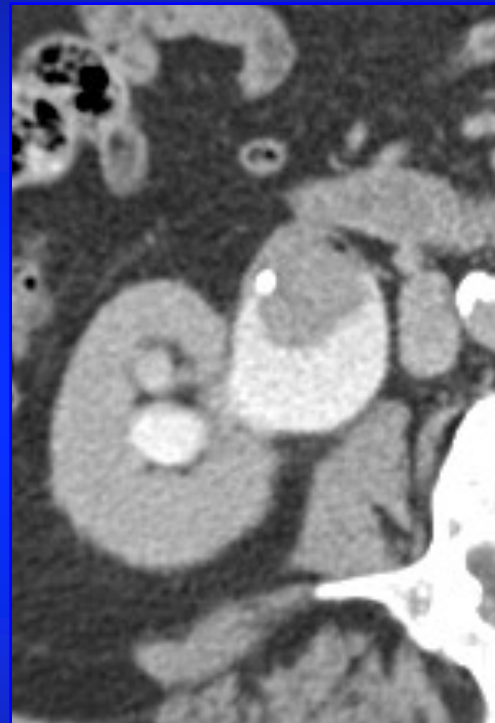
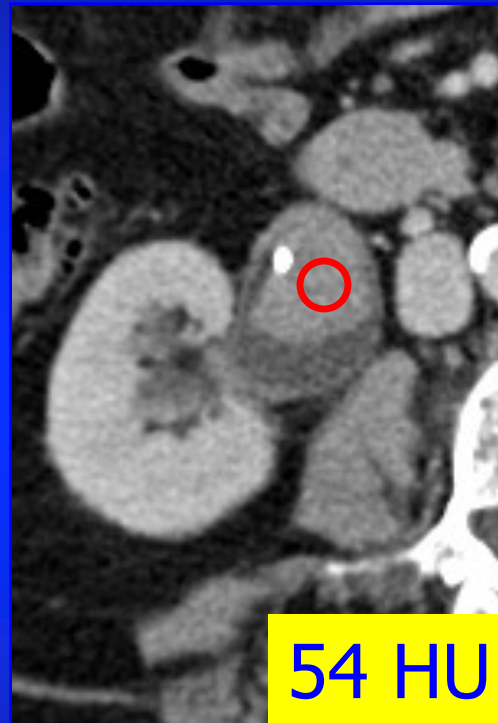
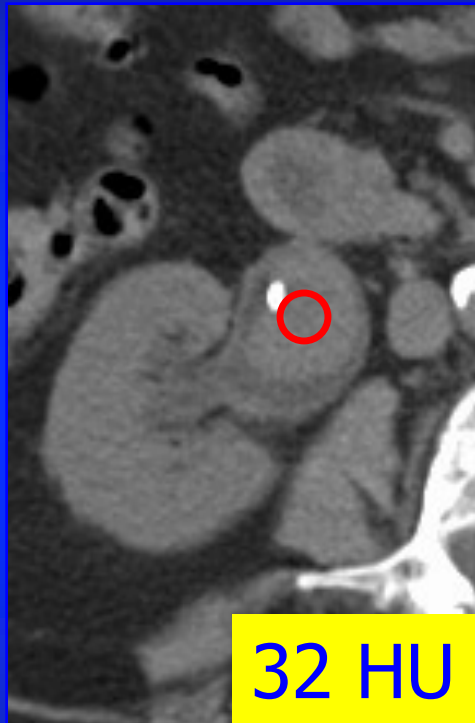
- Indication: to assess renal stone burden/metabolic activity in an asymptomatic patient
- Contrast: None
- Scan Delay: n/a
- Scan FOV: abdomen



Urogram

- Indication: painless hematuria, suspected bladder or urothelial mass, hydronephrosis of uncertain etiology, suspected ureteral injury.
- Contrast: oral (water) and iv
- Scan Delay: non-con abdomen/pelvis, 100 sec kidney, 15 minute abdomen/pelvis
- Scan FOV: abdomen/pelvis
- Patients get 200 ml IV saline

Hx of gross hematuria



**urothelial CA in
renal pelvis**

Urogram – under 35

- Indication: Same as regular CTU but patient under 35
- Contrast: oral (water) and iv (125 cc)
- Scan Delay: non-con abdomen/pelvis then inject 50 cc, wait 10 minutes, inject 75 cc then scan at 100 seconds
- Scan FOV: abdomen/pelvis
- Patient gets 250 cc saline with first contrast bolus.



Cystogram

- Indication: suspected bladder injury
 - Contrast: intravesical
 - Scan Delay: none
300 ml given over 10 min
 - Scan FOV: pelvis
- to bladder until
again



How to actually protocol

- Use BWH Abdominal CT worklist in Epic
- Goal is to have studies protocolled one week in advance



Protocol in Epic

The screenshot displays the Epic EMR interface for a user named DANIEL I. M.D. GLAZER. The top navigation bar includes buttons for 'Protocol Work List' and 'Update Protocols', which are highlighted by yellow arrows. Other navigation options include 'Study History', 'Chart', 'Hospital Chart', 'Encounter', and 'Orders Only'. The 'In Basket' section on the left lists various message types, with 'Chart Completion' selected. The main content area shows a table of chart completion tasks with columns for Due Date, Patient, Deficiency, Status, Encounter Date, and From When.

Due Date	Patient	Deficiency	Status	Encounter Date	From When

Protocol in Epic

Production - BWH IMG IR CSIR - DANIEL I. M.D. GLAZER

Epic Protocol Work List Update Protocols Study Review Study History Chart Hospital Chart Encounter Orders Only

EpicCare DANIEL I. M.D. GLAZER Search

Protocol Work List: BWH Abdominal CT, Total Count: 13


Refresh Views Chart Snapshot Imaging Change Order Hide Report Recent Protocols Orders Only Notes PHS Viewer More


Note	Pt	Pri	Patient	BWH MRN	Procedure	Imaging Order Panel	Mo	Accession	Appt Location	Modality	Appt Date and Time
			Griffiths, Melinda J	11074044	CT Abdomen Only (No Pelvis)		CT	E12455471	BWH	BWH BT...	7/6/2019 10:45 AM
			Le, Quang	23541493	CT Abdomen Only (No Pelvis)		CT	E12595125	850	BWH 850 ...	7/8/2019 10:00 AM
			Scaletta, John	31246903	CT Abdomen Only (No Pelvis)		CT	E10108984	BWH	BWH SH...	7/8/2019 2:15 PM
			Giuliano, John S	24284820	CT Abdomen Only (No Pelvis)		CT	E12163370	BWH	BWH BT...	7/9/2019 8:15 AM
			Soto Deramirez, Bertha	28917664	CT Abdomen/Pelvis		CT	E12548215	BWH	BWH SH...	7/9/2019 1:15 PM
			Amdur, Margaret S	17878646	CT Abdomen/Pelvis		CT	E12457498	BWH	BWH SH...	7/10/2019 10:15 AM
			Farrell, Debra L	06167415	CT Urogram		CT	E8851491	BWH	BWH SH...	7/10/2019 11:00 AM
			Williams, Teneka Lasalle	12123709	CT Abdomen Only (No Pelvis)		CT	E12553065	850	BWH 850 ...	7/10/2019 11:15 AM
			Moos, Richard	33216706	CT Abdomen/Pelvis		CT	E8953107	BWH	BWH SH...	7/10/2019 1:00 PM
			O'Brien, Harold	37896446	CT Abdomen/Pelvis		CT	E10347433	BWH	BWH SH...	7/10/2019 1:00 PM
			Lewis, Marion	03578796	CT Abdomen/Pelvis		CT	E10351671	BWH	BWH SH...	7/10/2019 1:15 PM
			Pitchayanonnetr, Somchai	11732997	CT Abdomen/Pelvis Enterography		CT	E11985788	BWH	BWH SH...	7/10/2019 2:15 PM
			Gudrian, Alan	39289467	CT Abdomen/Pelvis	CT Chest/Abdomen/Pelvis	CT	E12597517	BWH	BWH BT...	7/10/2019 3:15 PM




Protocol in Epic

▼ CT ABDOMEN

Protocol  Other? ☐

IV Contrast  Omnipaque 350 None Other? ☐

Oral Contrast  Omnipaque 240 - 50mL (dilute as prescribed) Other? ☐

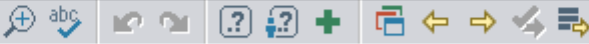
Barium 900 mL

Water 900 mL

Volumen 1350 mL

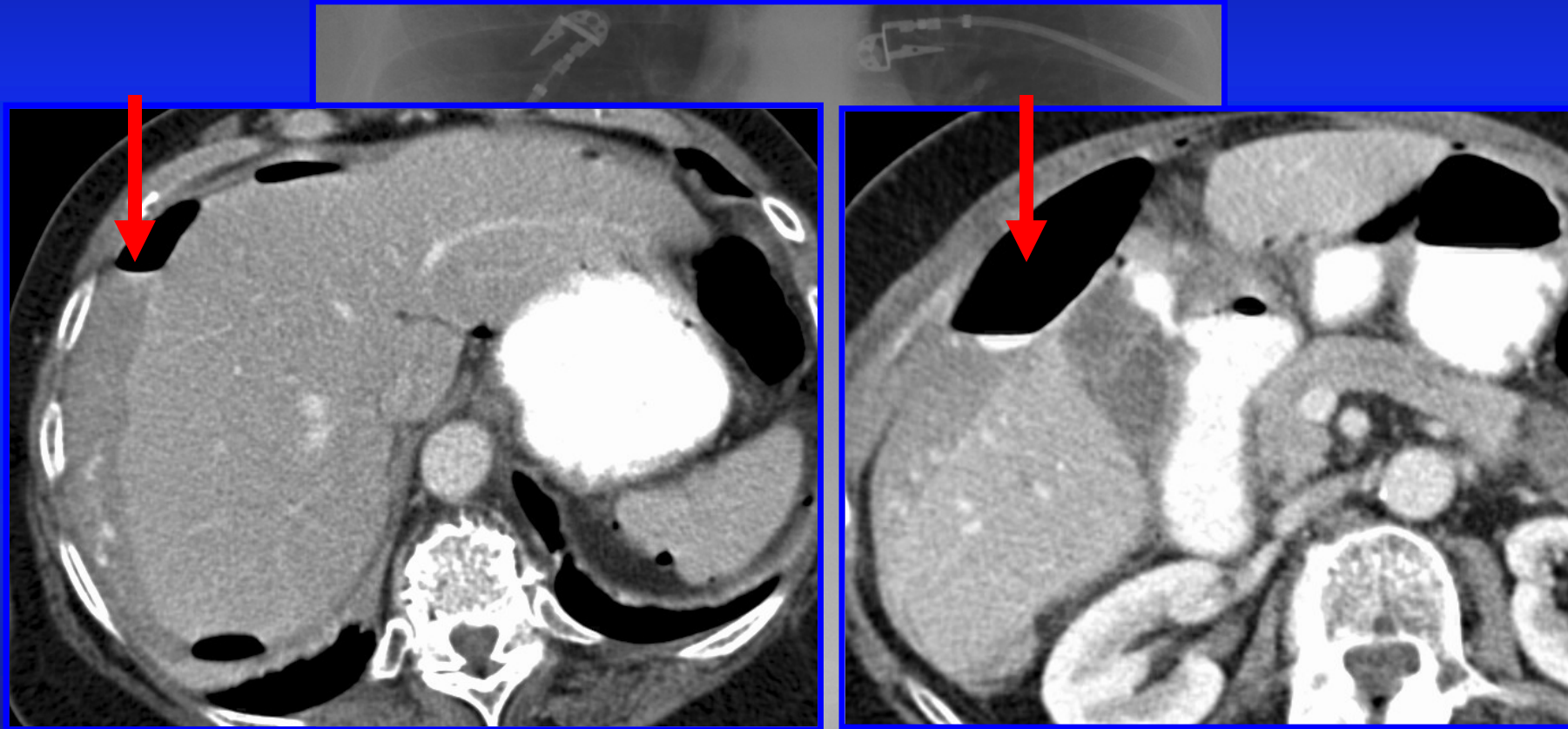
Breeza 1000 mL

No Oral Contrast

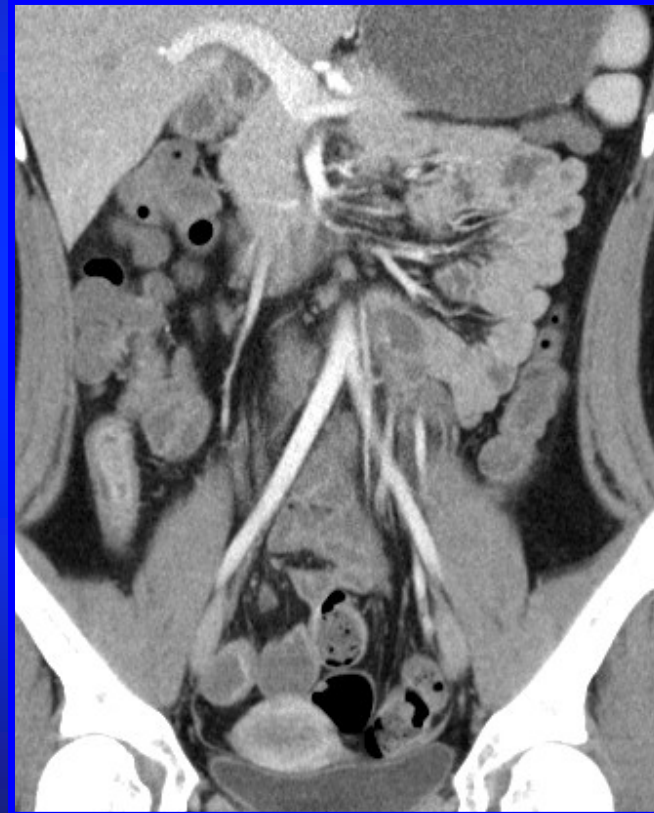
Comment 

Cases

Which enteric contrast to use?



Abdominal pain, history of Crohn's. Which enteric contrast?



IV contrast questions

- Patient is on dialysis. Is it ok to give IV contrast?
 - YES
- Patient is allergic to topical iodine. Do they need a steroid prep?
 - NO
- Patient had prior reaction with throat closing. Do they need a steroid prep?
 - MAYBE – Patient should see allergy before another contrast enhanced scan

Protocol Questions

- Renal cell carcinoma follow-up. What is the correct protocol?
 - Hypervascular tumor staging
- Painless hematuria. What is the correct protocol?
 - CTU
- Jaundice and suspected pancreatic cancer. What is the correct protocol?
 - Two phase pancreas
- Failed prior colonoscopy. What is the correct protocol?
 - Diagnostic colonography

Summary

- IV contrast dose determined by weight based threshold. No reduced dose for lower eGFR
- Dilute Omnipaque the default enteric contrast agent
- Tailor the specific CT protocol to the clinical question to be answered
- Always ask for help if you aren't sure

Questions?

