UNC Lineberger Cancer Network

# ADVANCED PRACTICE PROVIDER

Live Lecture

**September 15, 2021**

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*The* **Advanced Practice Provider** *lecture series created and coordinated by* ***Tammy Triglianos,*** *DNP, ANP-BC, AOCNP, in partnership with the* UNC Lineberger Cancer Network

POLL EVERYWHERE

## Join by Web



1. Go to **PollEv.com**
2. Enter **UNCCN**
3. Respond to activity

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1. Text **UNCCN** to **22333**
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1. Download the app
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**Participants must attend using one of the following:**

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- **At a designated site with a site coordinator**

**The following do NOT qualify for CE credit:**

- **Joining Zoom using Phone audio only**
  *(using the Zoom Android or iPhone app is fine)*
- **Watching with MediaSite**

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- **View 50 minutes or more**
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3rd Wednesday
4 pm – 5 pm

NCPD/CNE

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UNC Lineberger Cancer Network

# ADVANCED PRACTICE PROVIDER

*September 15, 2021*

## Introduction to Abdominal CT

**Lauren M.B. Burke, MD**

**Katrina A. McGinty, MD**

# OUR PRESENTER

**Lauren M.B. Burke,**
**MD**

Lauren M.B. Burke, MD,'s time at UNC spans almost 20 years undergraduate, medical school, residency, and faculty. After completing an Abdominal Imaging fellowship at Duke University in 2013, she returned to UNC as a Clinical Assistant Professor. From co-authoring imaging research as an undergraduate, to serving as Diagnostic Radiology Chief Resident, to receiving the RSNA Roentgen Resident/Fellow Research Award in her senior residency year, Burke became an established scholar and leader within the Department in her formative years in medicine.

Dr. Burke would like to continue to grow the Abdominal Imaging Division with the addition of two more faculty members. This will help provide stability and ensure the division is able to continue to provide high-quality clinical care, educate our resident and fellows, and produce impactful research.

# OUR PRESENTER

**Katrina A. McGinty,**
**MD**

Katrina A. McGinty, MD,'s global health work is primarily in Malawi, where she facilitates a formal ultrasound curriculum within the Kamuzu Central Hospital's Department of Radiology to increase the ultrasound skills of the imaging technologists.

Additionally, she collaborates with other UNC departments through UNC-Project Malawi and at Kamuzu Central Hospital to promote and to teach about relevant imaging appropriateness criteria.

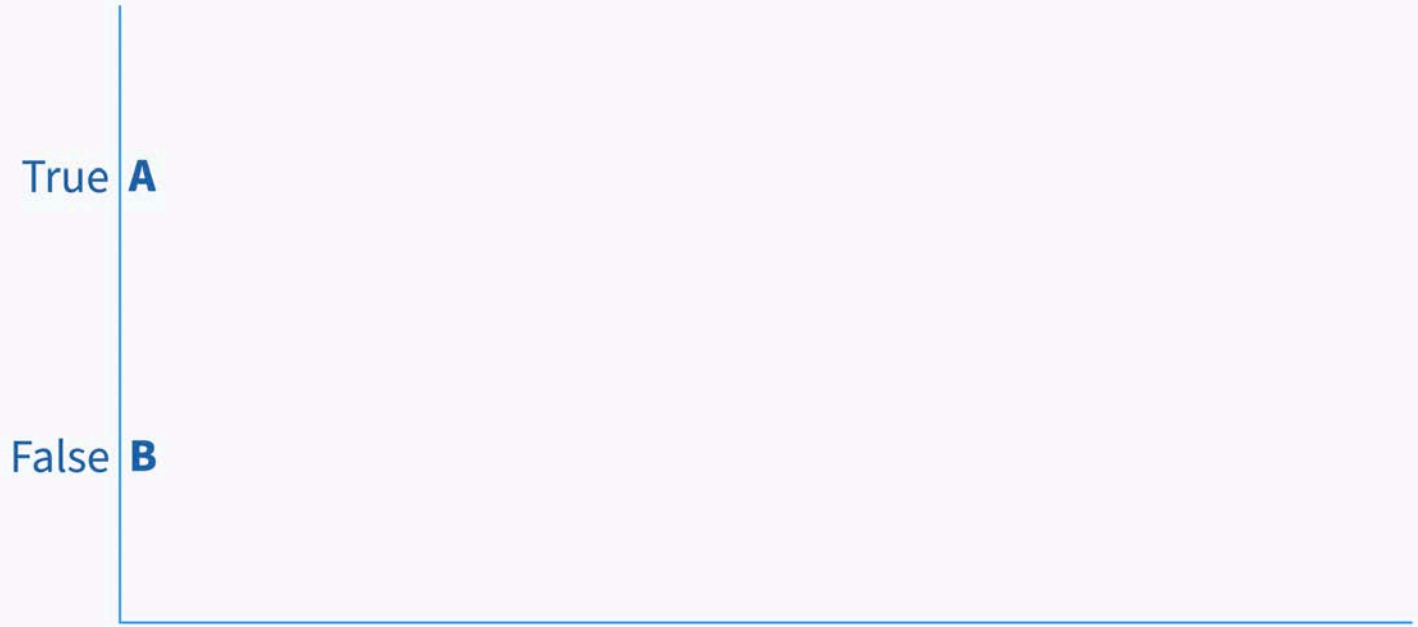
Respond at **PollEv.com/unccn**

Text **UNCCN** to **22333** once to join, then **A or B**

UNC LINEBERGER COMPREHENSIVE CANCER CENTER

UNC Lineberger Cancer Network

**An abdominal computed tomography (CT) scan is an imaging method. It uses x-rays to create cross-sectional pictures of the body.**



# DISCLOSURES

This activity has been planned and implemented under the sole supervision of the course directors, in association with the UNC Office of Continuing Professional Development (UNC CPD). William A Wood, MD, MPH, and CPD staff have no relevant financial relationships with commercial interests as defined by the ACCME.

Lauren M.B. Burke, MD, and Katrina A. McGinty, MD, have no financial relationships with commercial interests as defined by the ACCME.

# Introduction to Abdominal CT

Lauren MB Burke MD
Associate Professor of Radiology
Division Chief of Abdominal Imaging
Vice Chair of Clinical Operations

Katrina A McGinty MD
Associate Professor of Radiology
Director of Core Laboratory Services
Associate Program Director

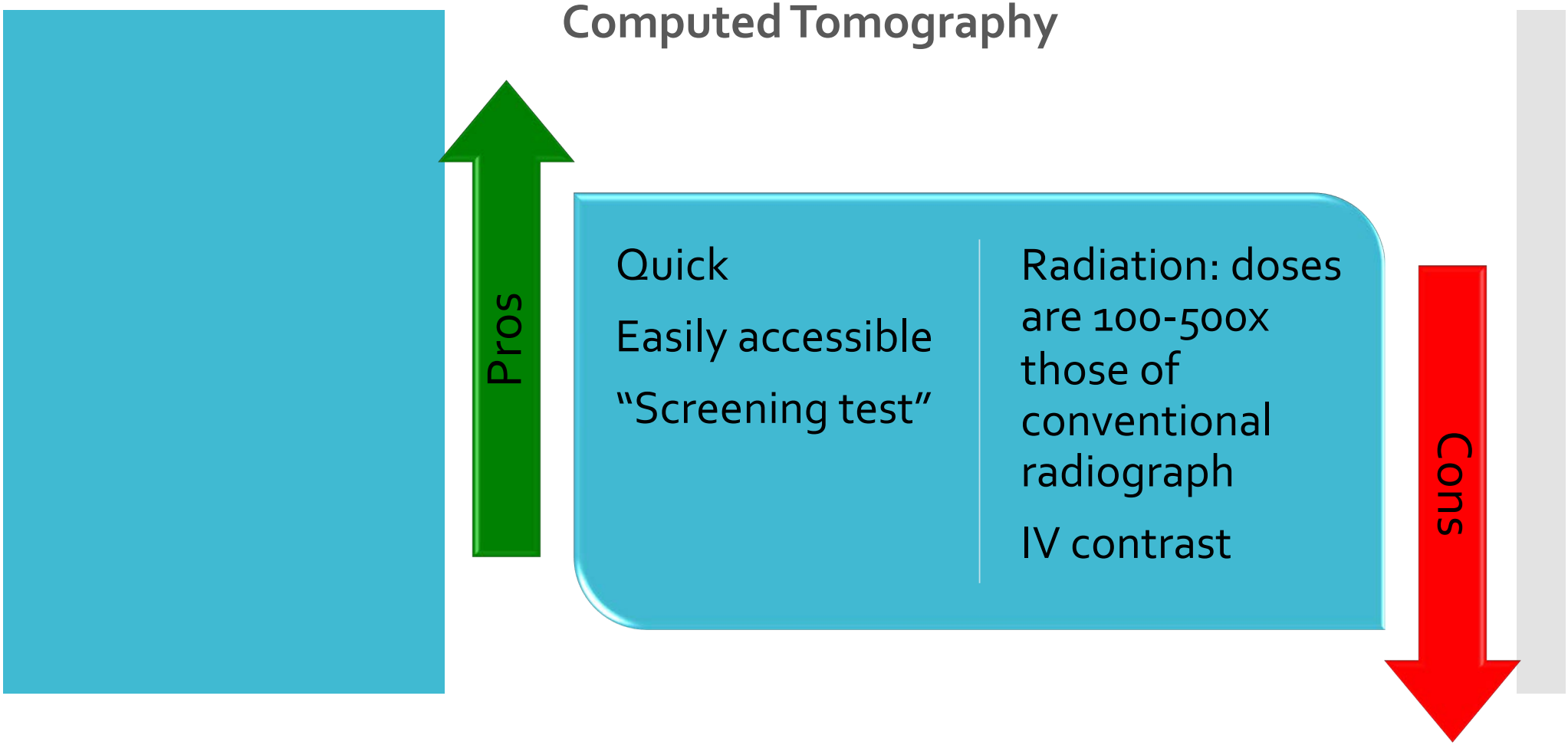
# Goals and Objectives

- Discuss the process of using a search pattern in evaluating CT results
- Review basic abdominal anatomy by CT
- Identify common presentations of metastatic disease on CT scan

# Outline

- Background:
  - Foundations
  - Ordering
  - Contrast
- The FUN part!  How to read an abdominal CT

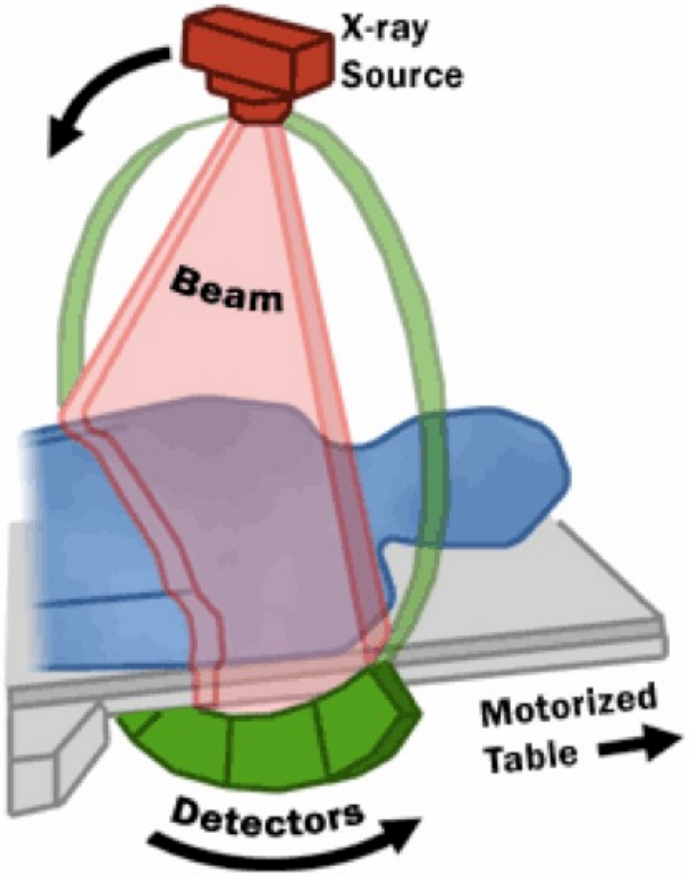
## Computed Tomography



# Fundations

- Large ring with central bore, not too deep
- Table slides through the bore
- Outer ring circles around the patient

# Fundations




http://www.fda.gov/Radiation-EmittingProducts/RadiationEmittingProductsandProcedures/MedicalImaging/MedicalX-Rays/ucm115317.htm

# When to order a CT of the abdomen and pelvis?

https://www.acr.org/-/media/ACR/Files/Practice-Parameters/ct-abd-pel.pdf

# When to order a CT of the abdomen and pelvis?

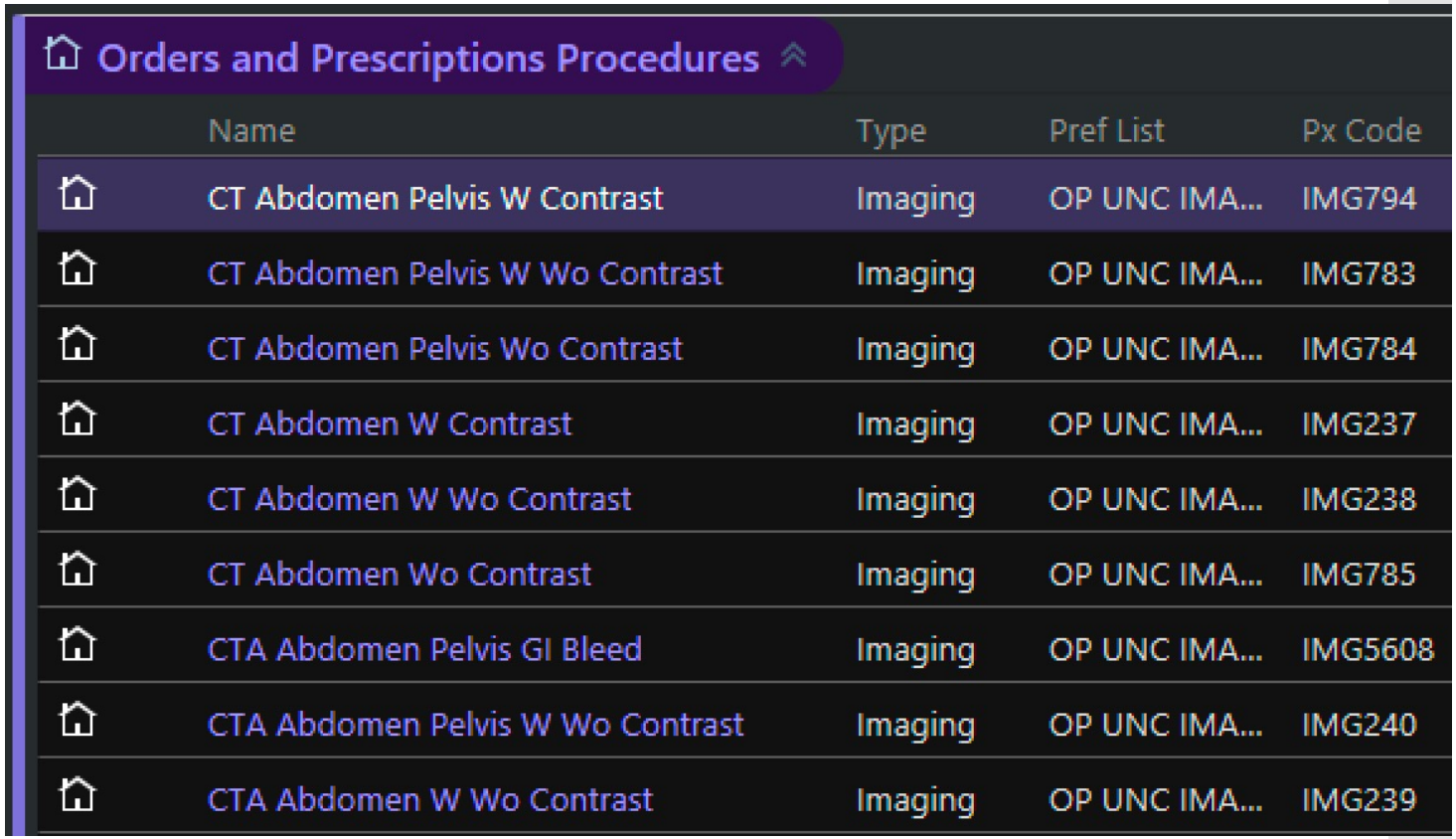
- Some common indications:
  - Evaluation of abdominal or pelvic pain
    - Suspected renal stone or appendicitis
  - Evaluation of abdominal trauma
  - Evaluation of malignancy or suspected mass
  - Evaluation of renal or adrenal pathologies
  - Surveillance of abdominal malignancy
  - Evaluation of the post-surgical abdomen for abscess or bowel pathology
  - Assessment of vascular structures
  - Evaluation of common bowel pathologies (e.g. obstruction)
- SO MANY **MORE**!

https://www.acr.org/-/media/ACR/Files/Practice-Parameters/ct-abd-pel.pdf

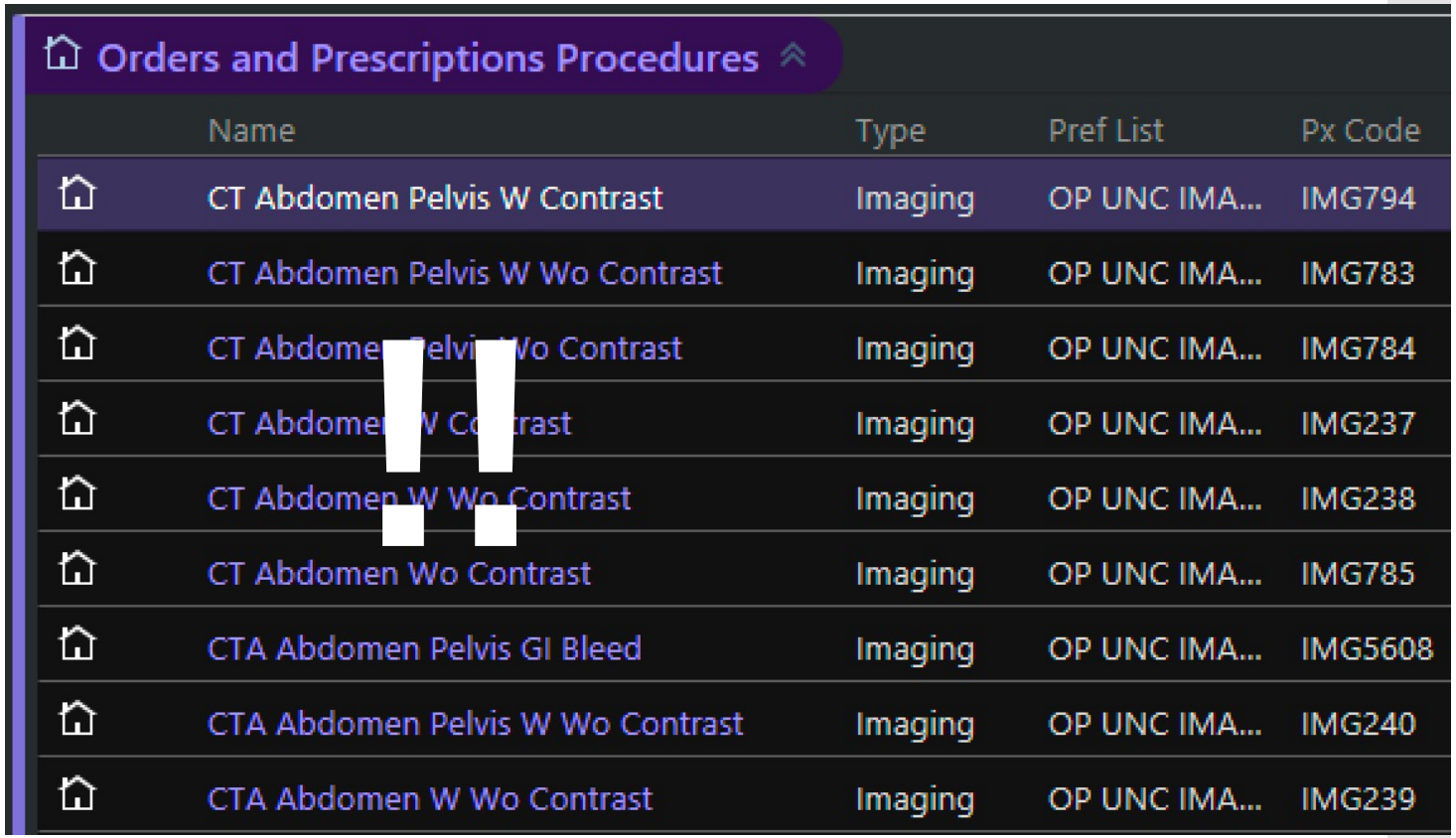
So you decide your patient needs a CT of the abdomen or abdomen and pelvis.  What next?

# You open EPIC!

EPIC has so many options!



EPIC has so many options!



**Do I need contrast? Can this patient tolerate contrast?**

# When to give IV contrast?

**Give contrast…**

- Infection
- Inflammation
- Neoplasm
- Lesion characterization
- Injury
- Vascular imaging

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**Give contrast…**

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- Neoplasm
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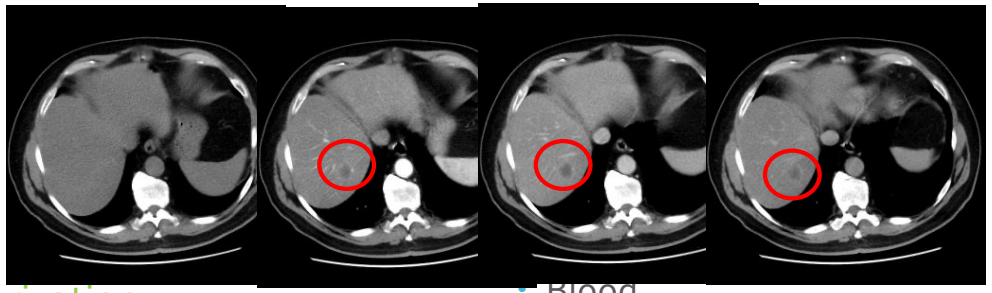
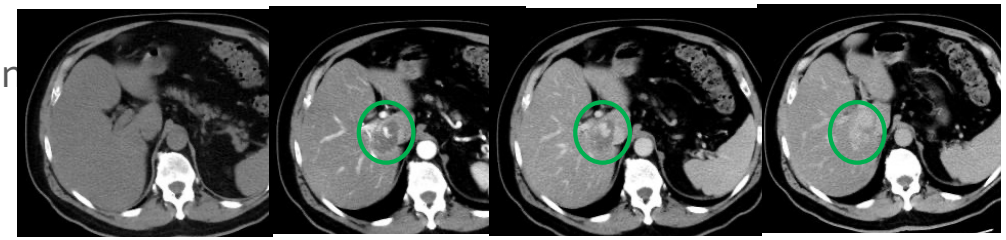
- Injury
- Vascular imagin
- Blood



METASTATIC DISEASE



HEMANGIOMA

# When to give IV contrast?

**Give contrast…**

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Case courtesy of Dr Jeremy Jones, Radiopaedia.org, rID: 45824

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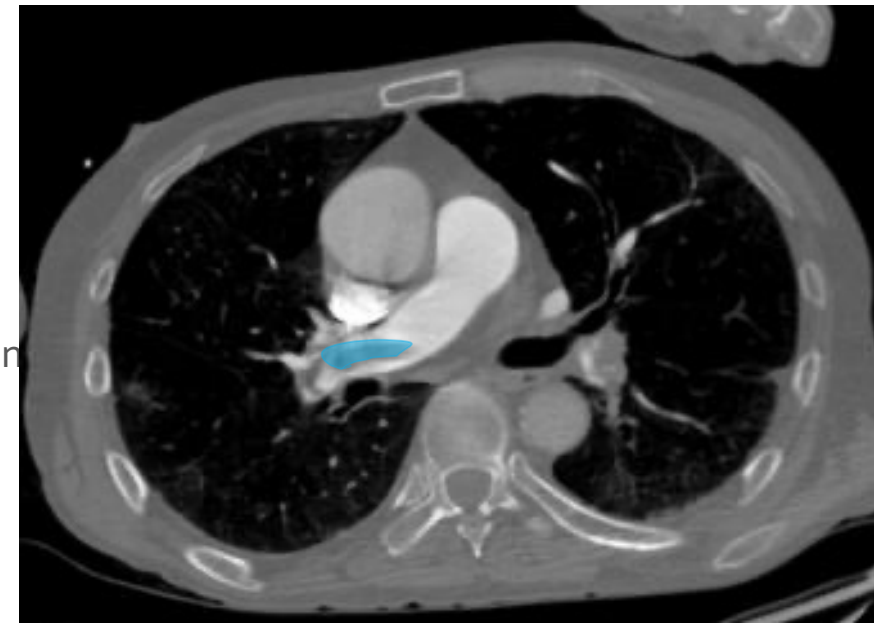


# When to give IV contrast?

**Give contrast…**

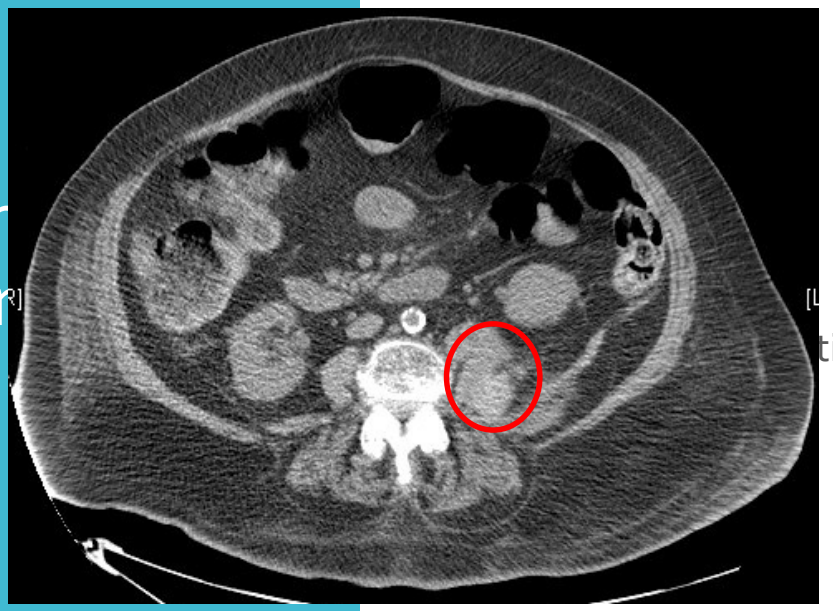
- Infection
- Inflammation
- Neoplasm
- Lesion characterization
- Injury
- Vascular imaging

**Don't give contrast…**

- If you are looking for something bright
- What's bright?
  - Blood
  - Bones
  - Calcium
  - Foreign bodies

Wher
IV cor

**Give contrast…**



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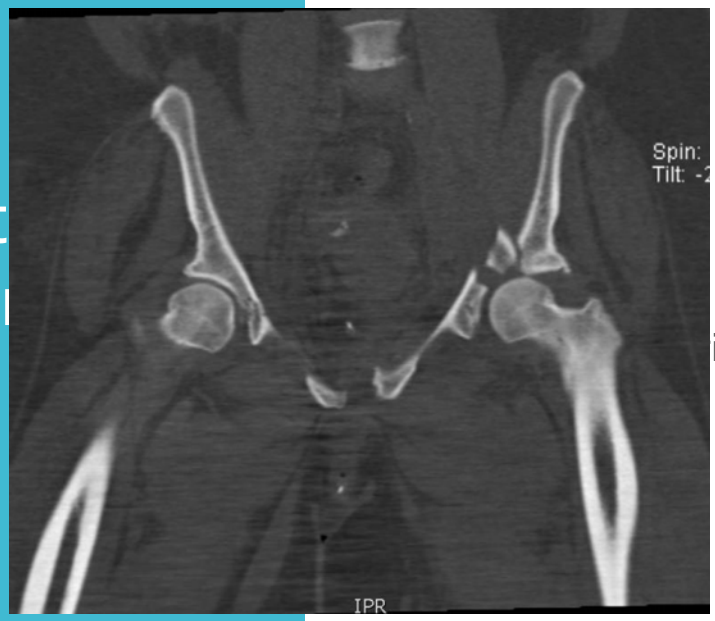


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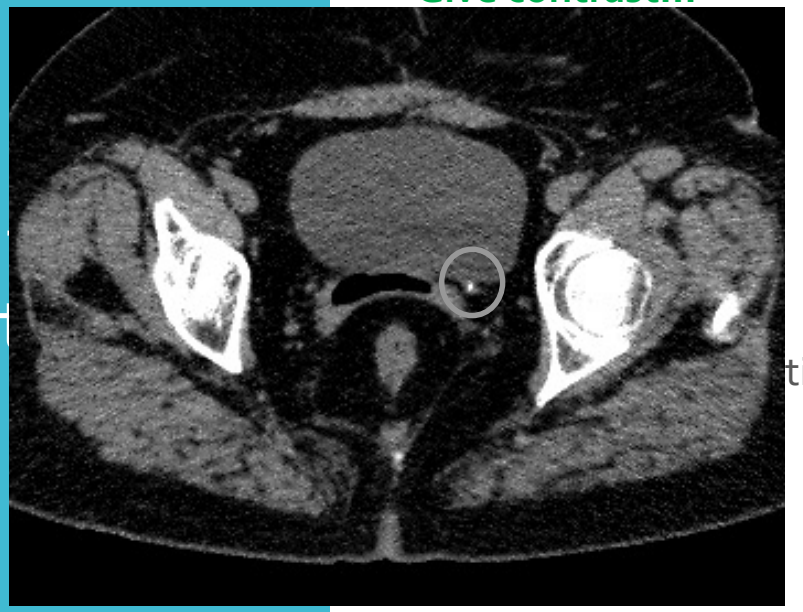

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**Give contrast…**

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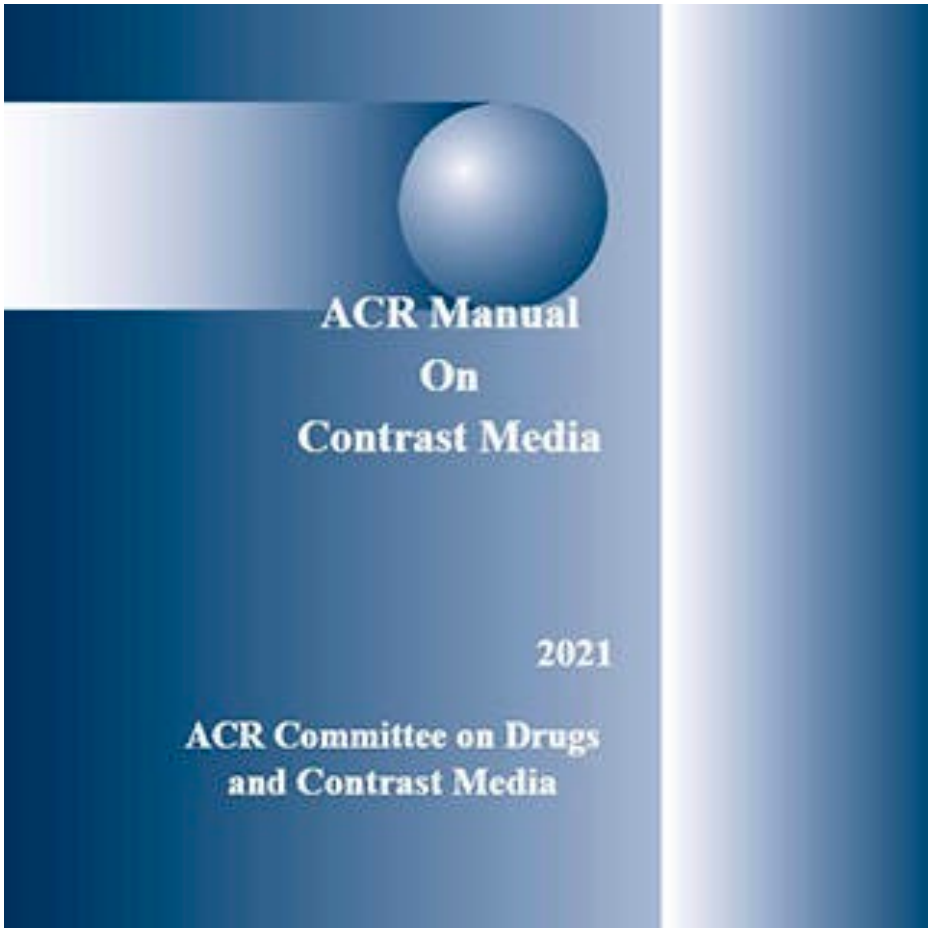
# Can my patient tolerate contrast?




Available at: https://www.acr.org/Clinical-Resources/Contrast-Manual

# IV contrast?

**Who can get IV contrast?**

# IV contrast?

## Who can get IV contrast?

- Normal renal function

# IV contrast?

## Who can get IV contrast?

- Normal renal function
- On hemodialysis who *aren't* making urine

# IV contrast?

## Who can get IV contrast?

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- No hx of allergic reaction to contrast

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- Hx of *mild* allergic reaction to IV contrast

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- Patients with shellfish allergy

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**Who can't?**

# IV contrast?

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## Who can't?

- Patients with impaired renal function (GFR less than 30)

# IV contrast?

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- On hemodialysis who *aren't* making urine
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- Hx of *mild* allergic reaction to IV contrast
- Patients with shellfish allergy

## Who can't?

- Patients with impaired renal function (GFR less than 30)
- Patients on hemodialysis who *are* making urine
- Patients with history of *severe* allergic reaction to IV contrast
- Patients with a breakthrough reaction to IV contrast


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Radiology

# Poll Everywhere Question #1

- 35 year old female comes into the ER with right sided flank pain and blood in her urine. You suspect she has an obstructive renal calculus. Which CT do you order?

A. Noncontrast CT abdomen and pelvis

B. Contrast enhanced CT abdomen and pelvis

# Poll Everywhere Question #1

- 35 year old female comes into the ER with right sided flank pain and blood in her urine. You suspect she has an obstructive renal calculus. Which CT do you order?

A. **Noncontrast CT abdomen and pelvis**

B. Contrast enhanced CT abdomen and pelvis

# Poll Everywhere Question #2

- 76 year old male with a history of rectal cancer comes in with new abdominal pain. Your primary concern is new metastatic disease to the abdomen. Which CT would you order?

A. CT abdomen and pelvis without contrast

B. CT abdomen and pelvis with and without IV contrast

C. CT abdomen and pelvis with IV contrast

# Poll Everywhere Question #2

- 76 year old male with a history of rectal cancer comes in with new abdominal pain. Your primary concern is new metastatic disease to the abdomen. Which CT would you order?

A. CT abdomen and pelvis without contrast

B. CT abdomen and pelvis with and without IV contrast

C. **CT abdomen and pelvis with IV contrast**

# Poll Everywhere Question #3

- Which patient is unable to receive iodinated contrast?

A. Normal renal function (GFR over 60)

B. Hemodialysis patient who is NOT making urine

C. A patient with a history of a breakthrough reaction

D. A patient with a history of an allergic reaction to contrast and prepped with a steroid prep

# Poll Everywhere Question #3

- Which patient is unable to receive iodinated contrast?

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B. Hemodialysis patient who is NOT making urine

**C. A patient with a history of a breakthrough reaction**

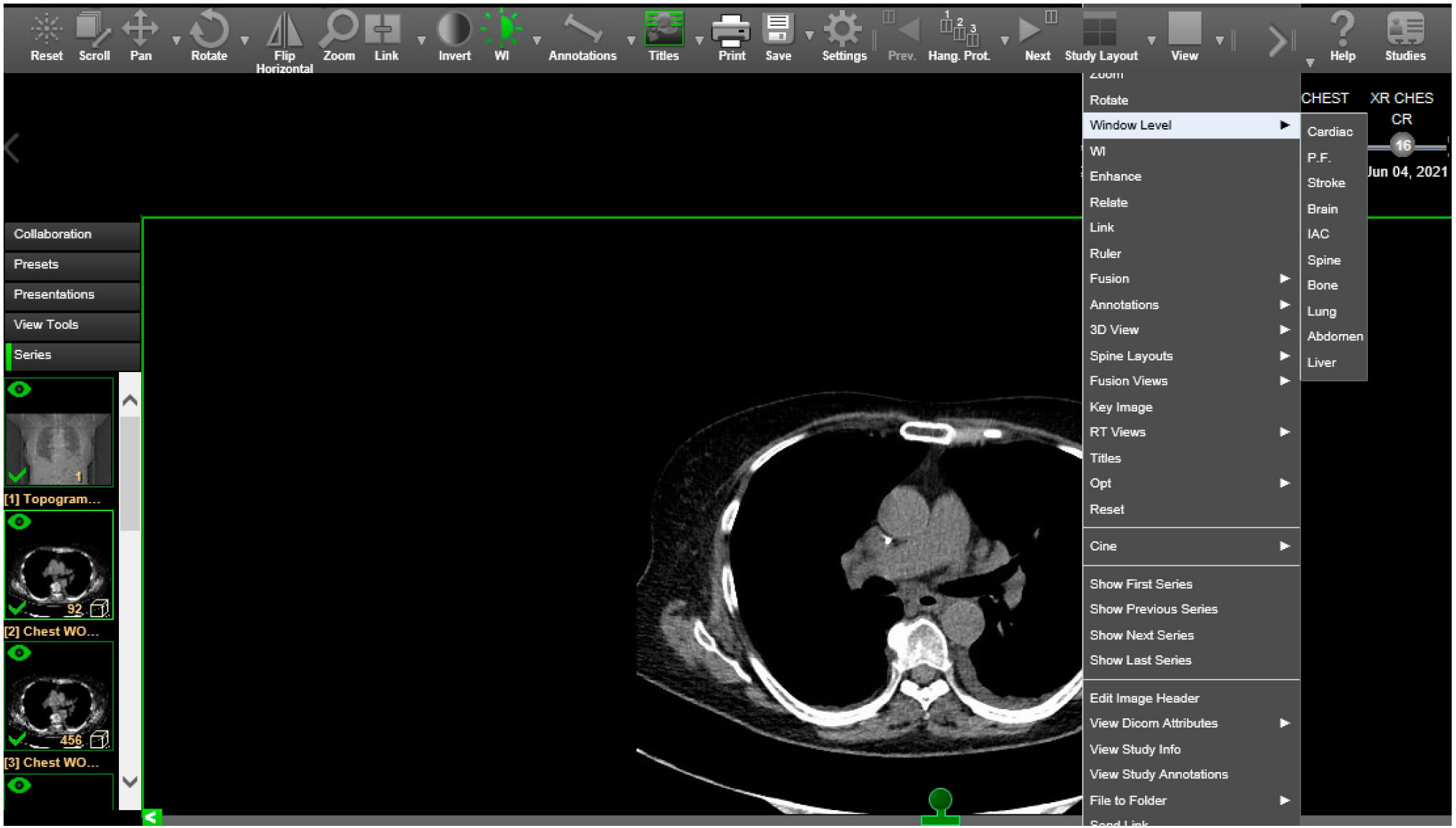
D. A patient with a history of an allergic reaction to contrast and prepped with a steroid prep

# How to approach

- Know your anatomy and what normal looks like
  - Normal has a LOT of variations
- Same search pattern for EVERY study
- Use different windows to optimize your search

# Normal CT

- Keep a consistent search pattern
- Lung windows
- Liver windows: High contrast for evaluation of the solid organs
  - Order: Liver/gallbladder, spleen, pancreas, adrenals, kidneys
- Soft tissue windows: "Workhorse" of abdominal imaging
  - Solid organs, bowel, peritoneum and retroperitoneum, soft tissues
- Bone windows
  - Evaluated bones for fractures, lesions, degenerative changes, etc


Reset
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[2] Chest WO...
[3] Chest WO...
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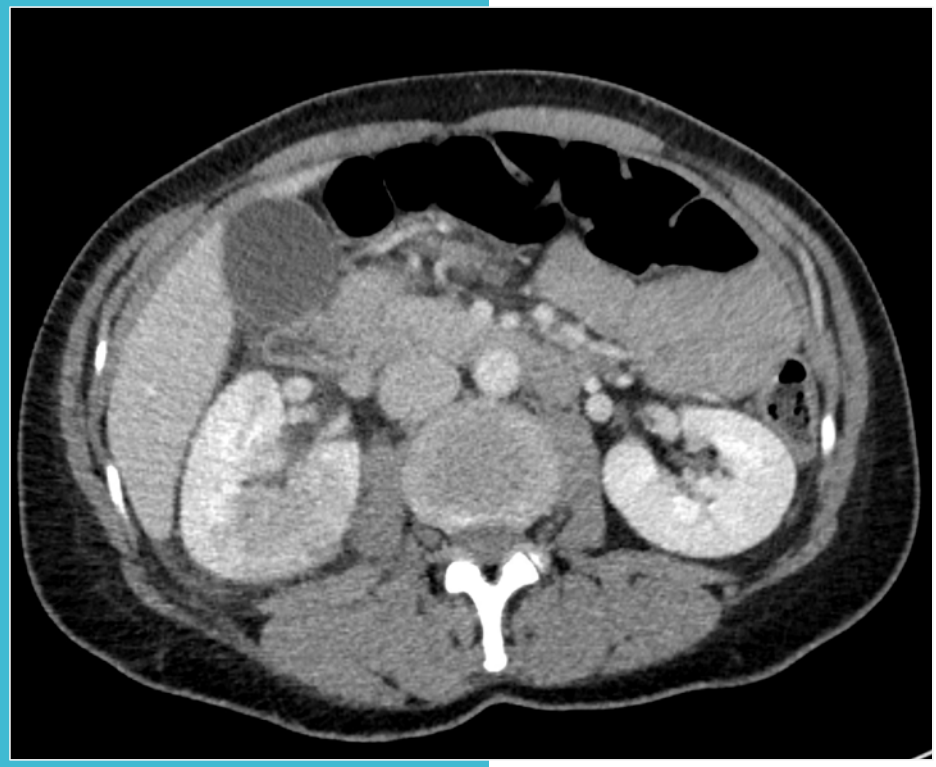
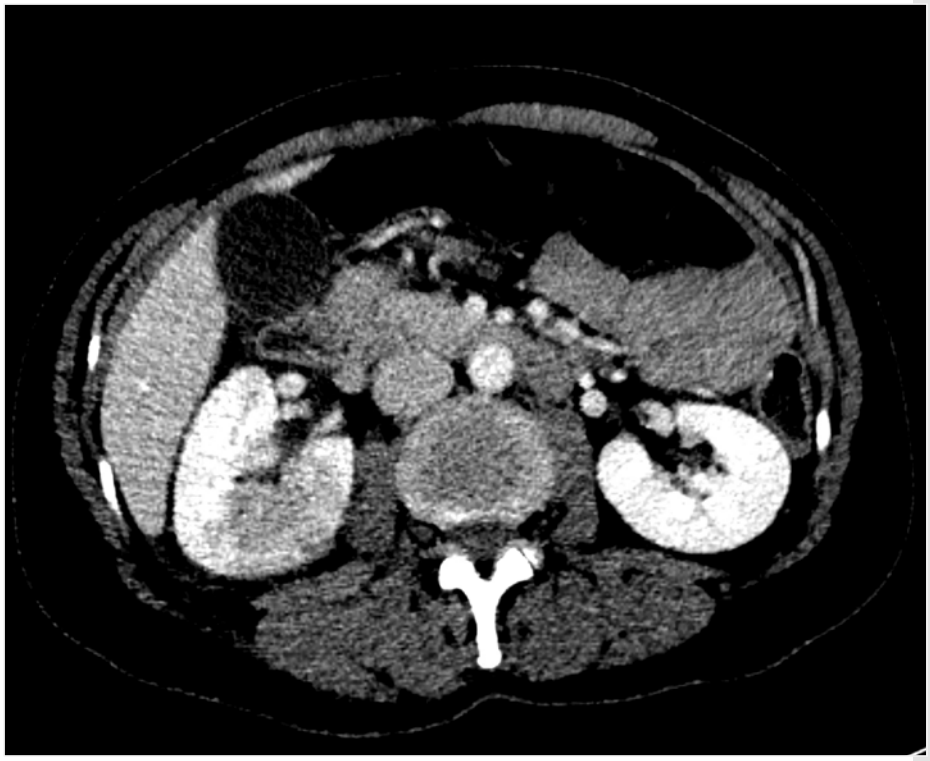
16
Jun 04, 2021

# Normal CT

Now some cases…

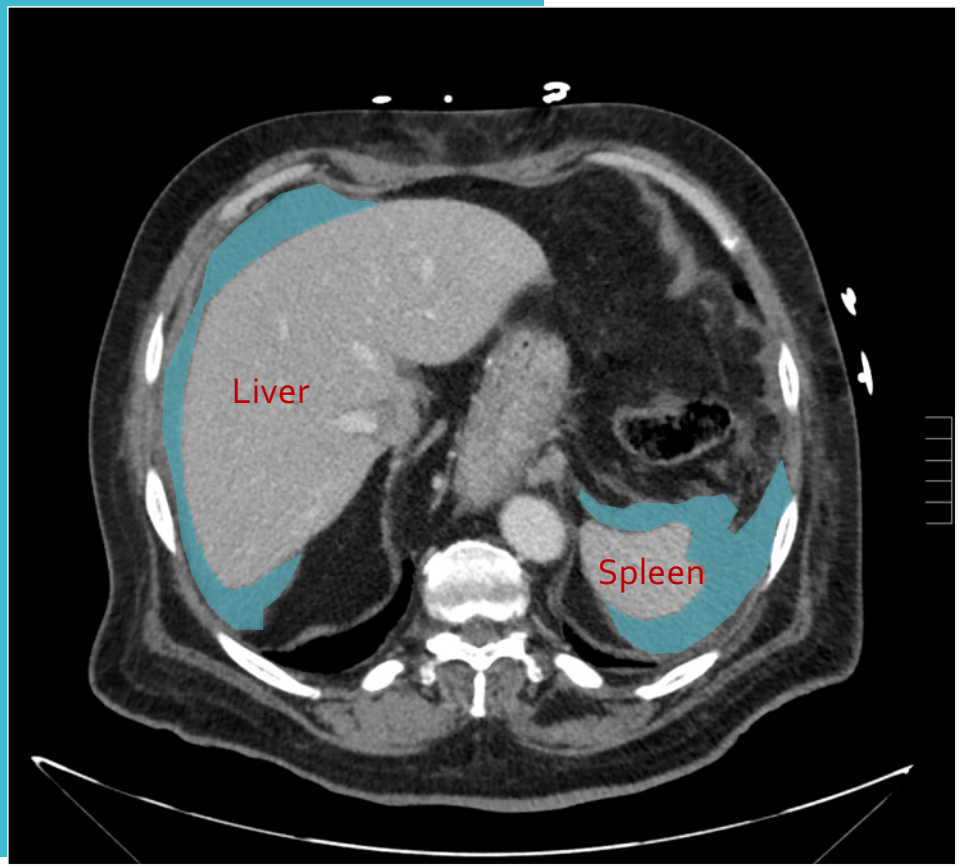




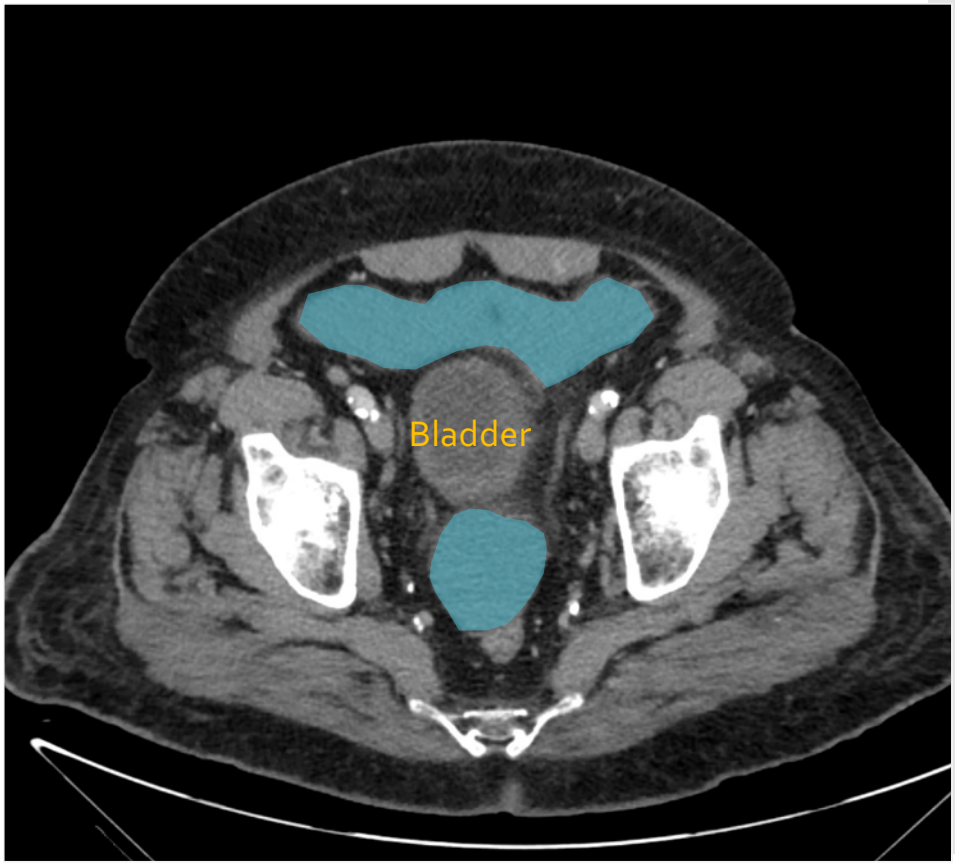
Perinephric stranding and heterogenous enhancement in the right kidney

Diagnosis? Pyelonephritis

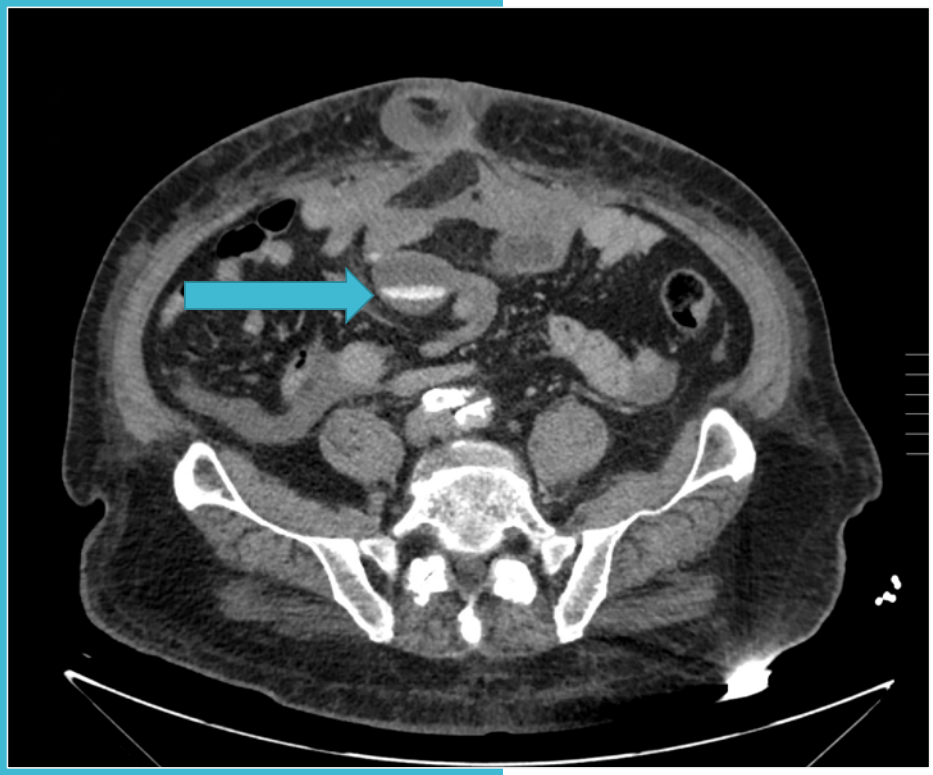
# Case 2




Perihepatic and perisplenic fluid

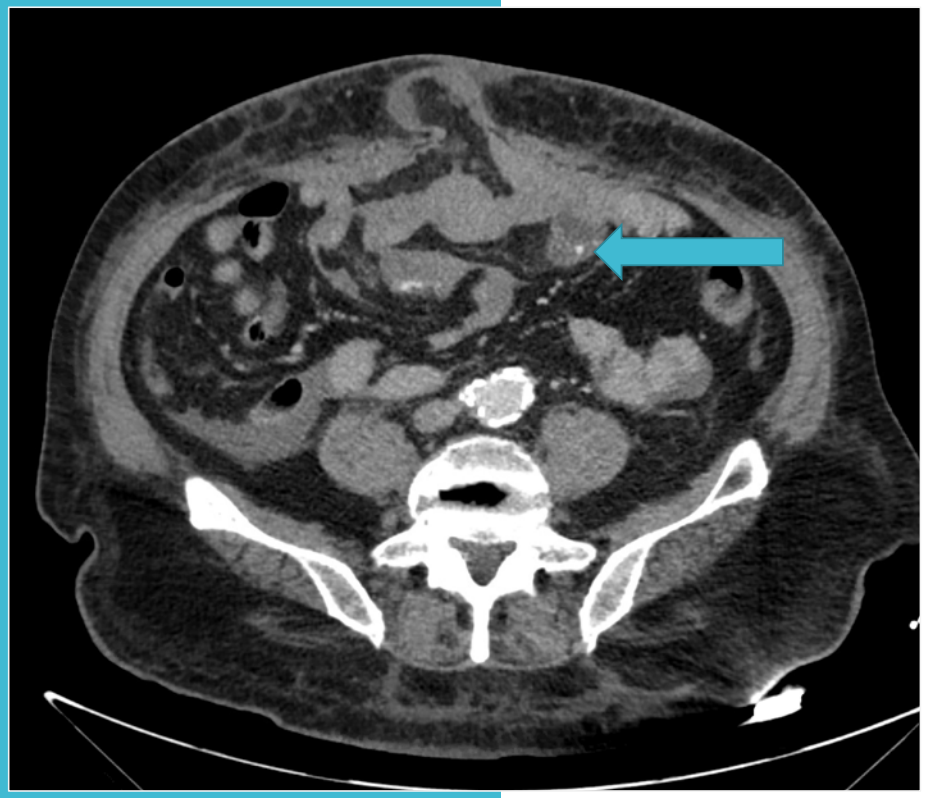



Fluid in the pelvis



High attenuation in the bowel

More conspicuous on liver windows



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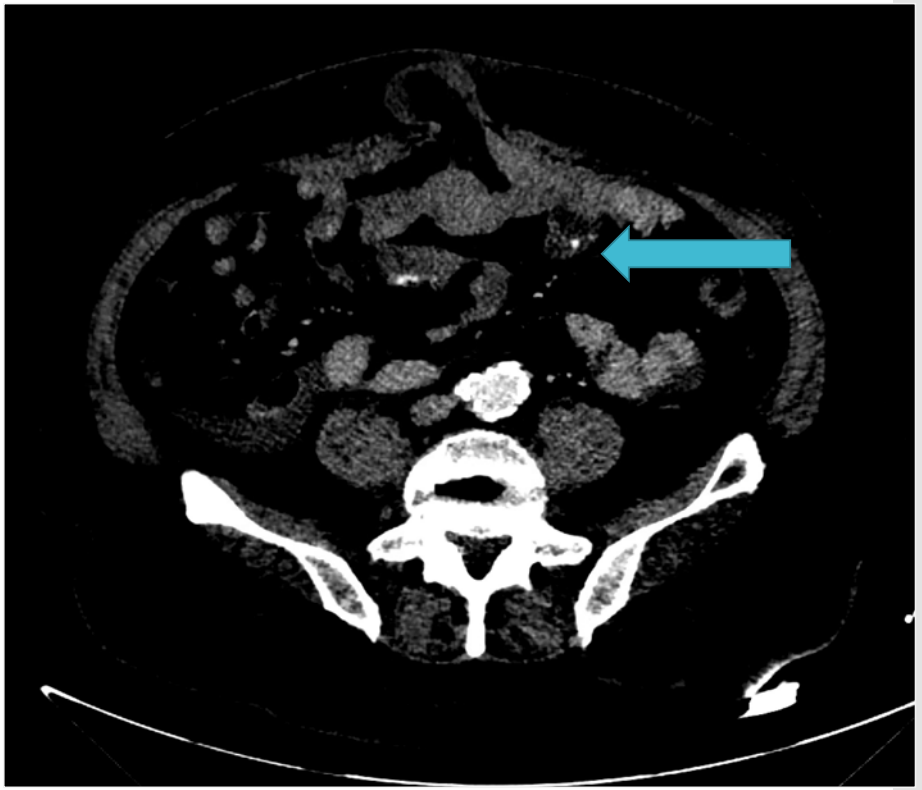

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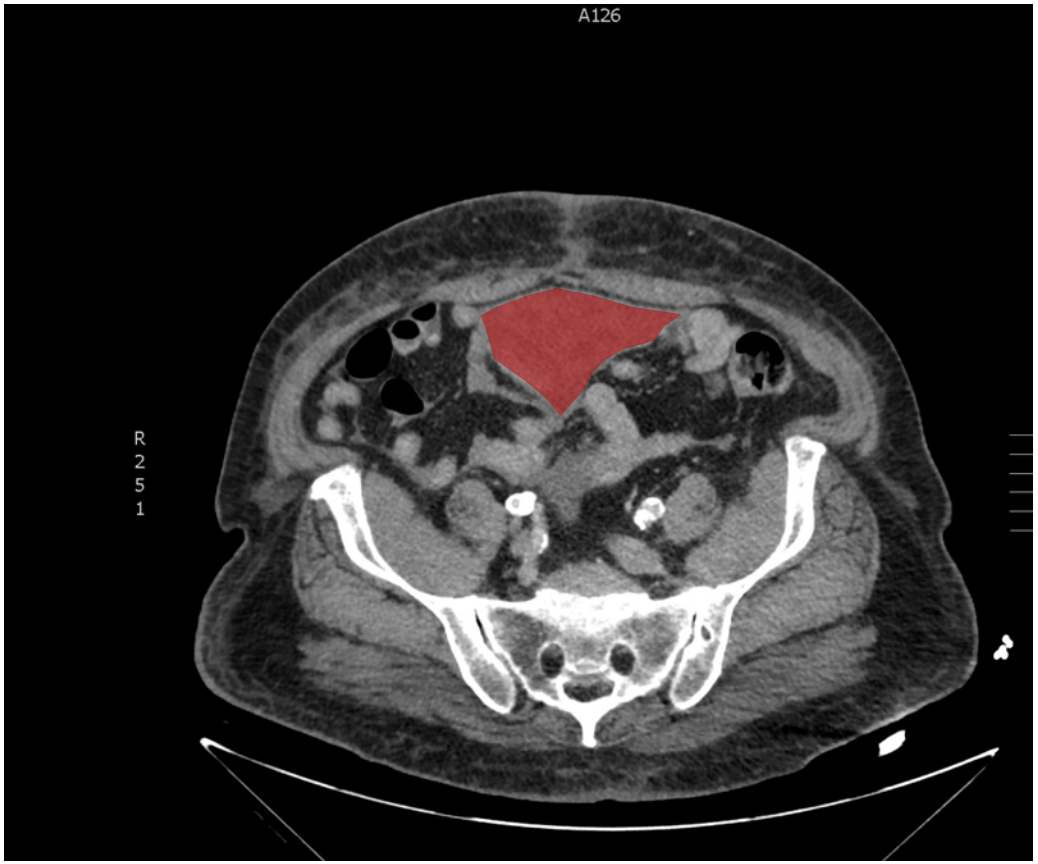
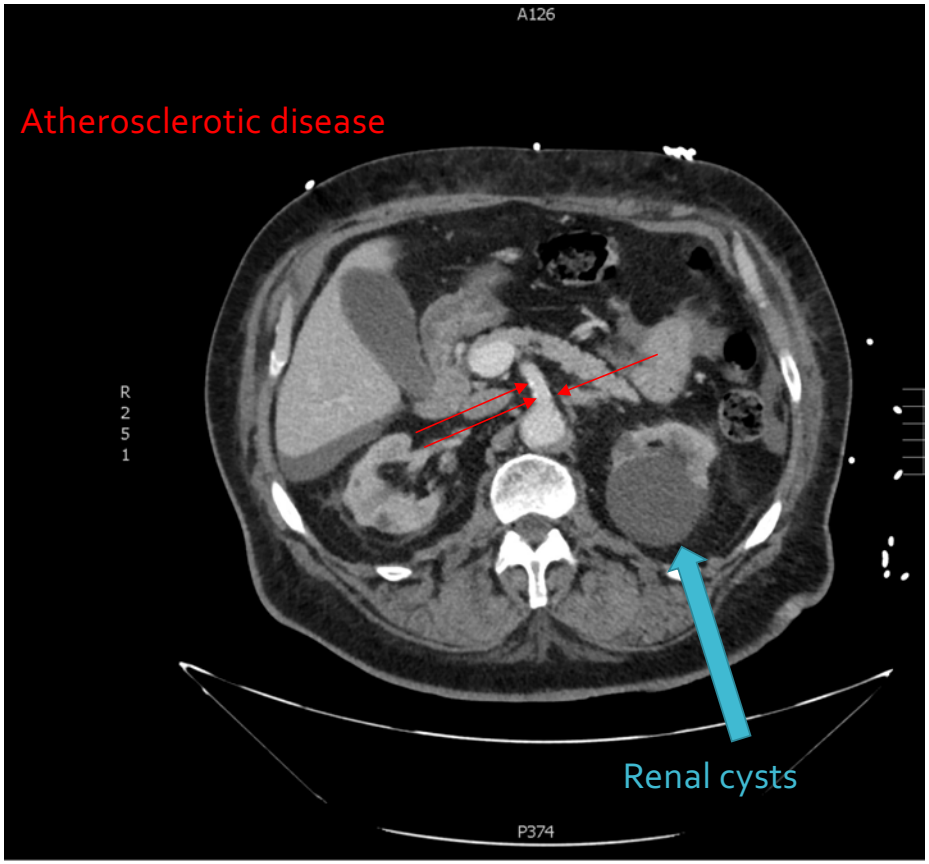



Intermediate attenuation adjacent to bowel

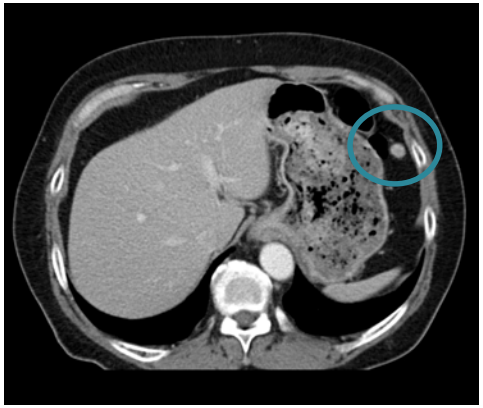



Some normal incidental findings

# Now for some oncology…

# Pearls of looking for metastatic disease

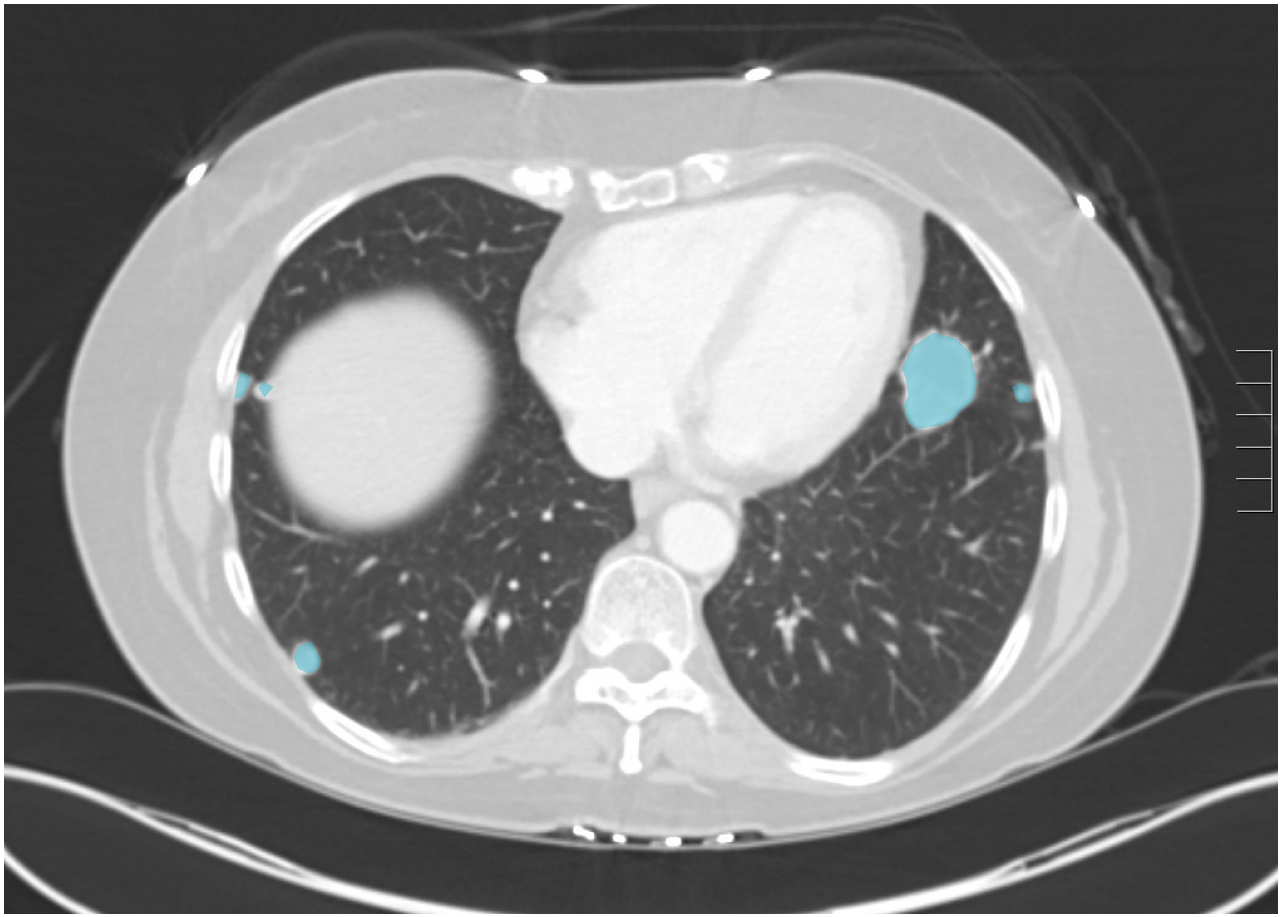
- Know your pattern of spread!
  - Direct extension
  - Hematogenous
  - Lymphangitic
  - Peritoneal seeding
- Metastasis tend to look like the primary
  - Hypovascular primary? Hypovascular met
- Don't forget lymph nodes!
  - Size
  - Shape
  - Texture/margins
  - Lymph nodes live near vessels!



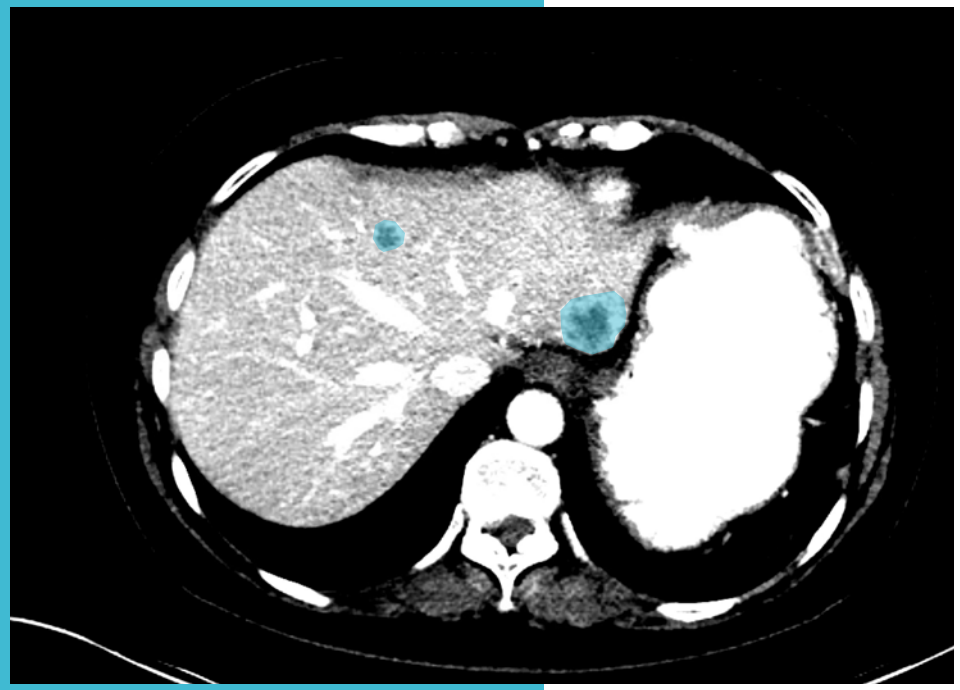
# Case 3

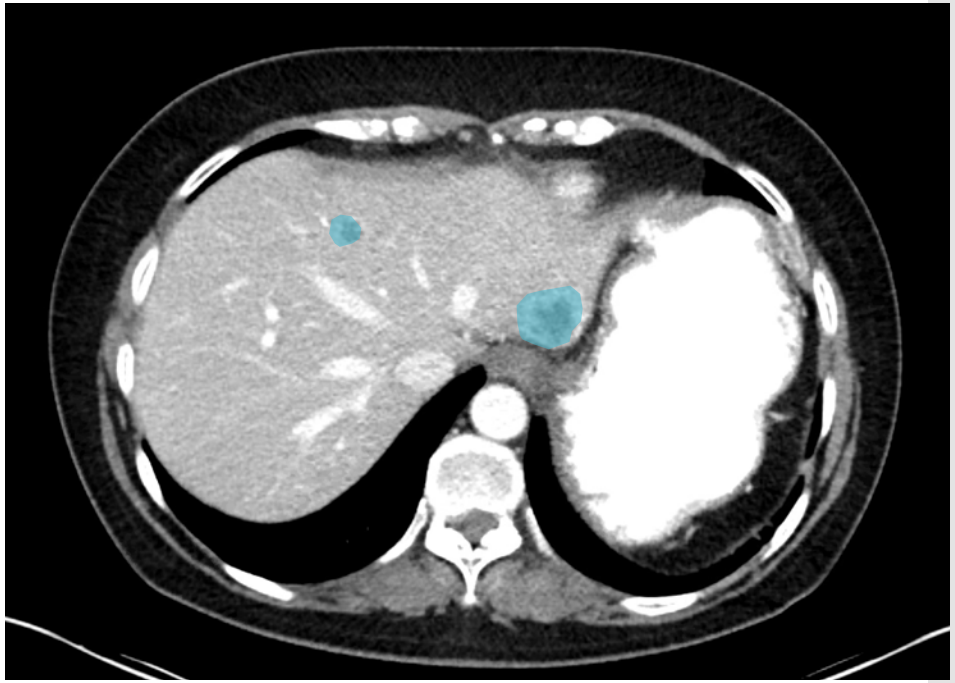
# Things to note in this case

- Missing kidney… metastatic renal cell carcinoma
- Know your patterns of spread!
  - Hematogenous spread
    - Lung
    - Liver
    - Adrenal glands
  - This pattern is typical of renal cell carcinoma and melanoma

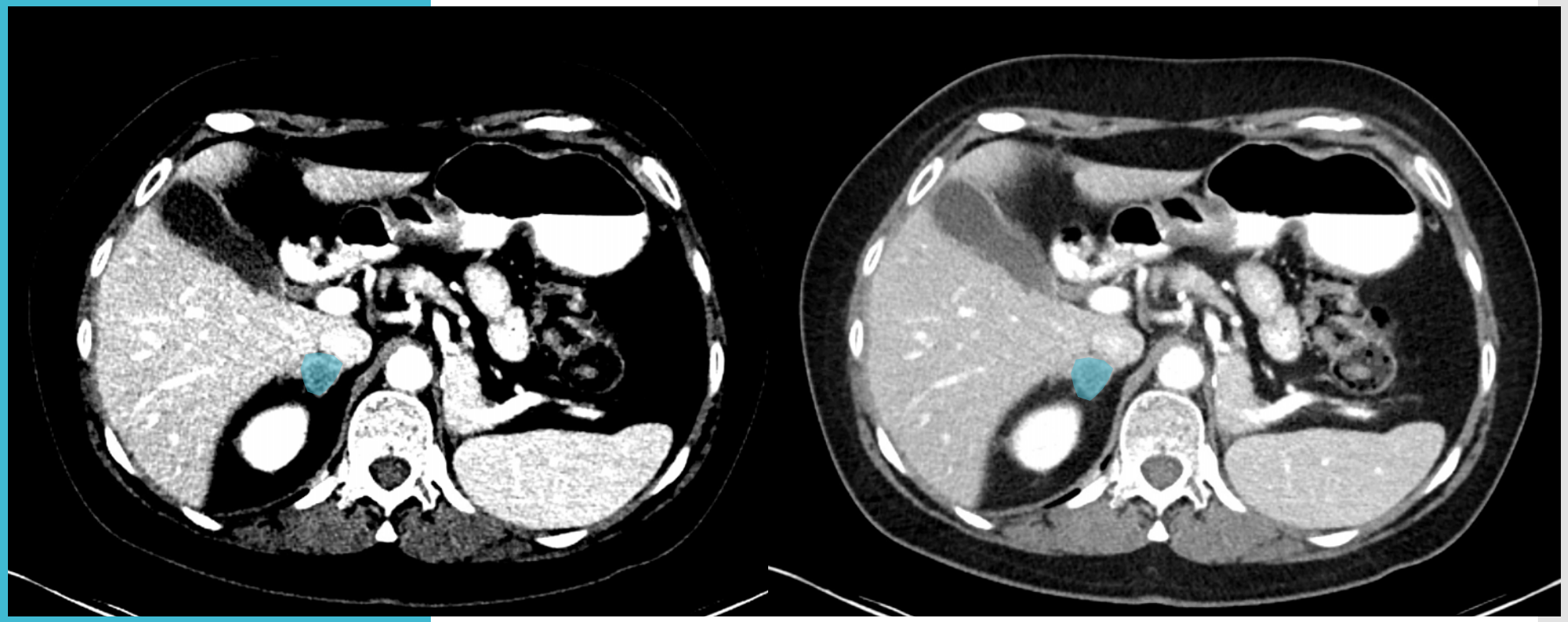


Metastatic lesion in the lung bases





Peripherally enhancing, centrally necrotic appearing hepatic metastasis

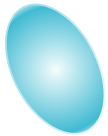


Right adrenal metastatic lesion and absent left kidney

# Case 4

# Normal vs abnormal nodes

Normal node



Central necrosis

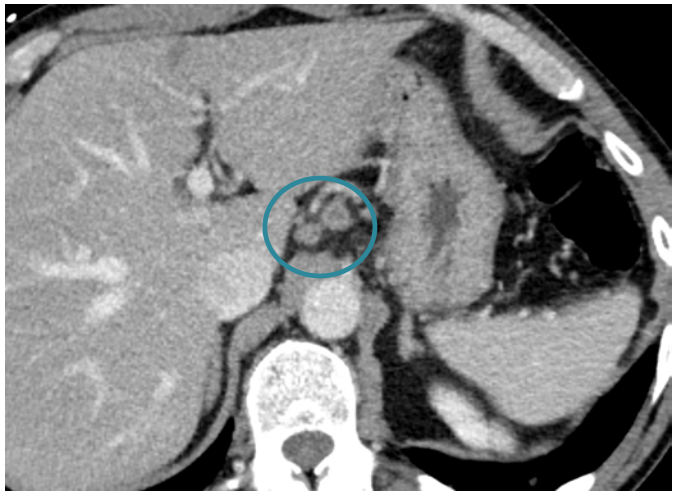
Rounded shape

Irregular margins

**Bladder cancer**

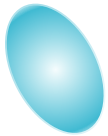
**3 months later**

Increased in size
Central low attenuation



# Normal vs abnormal nodes

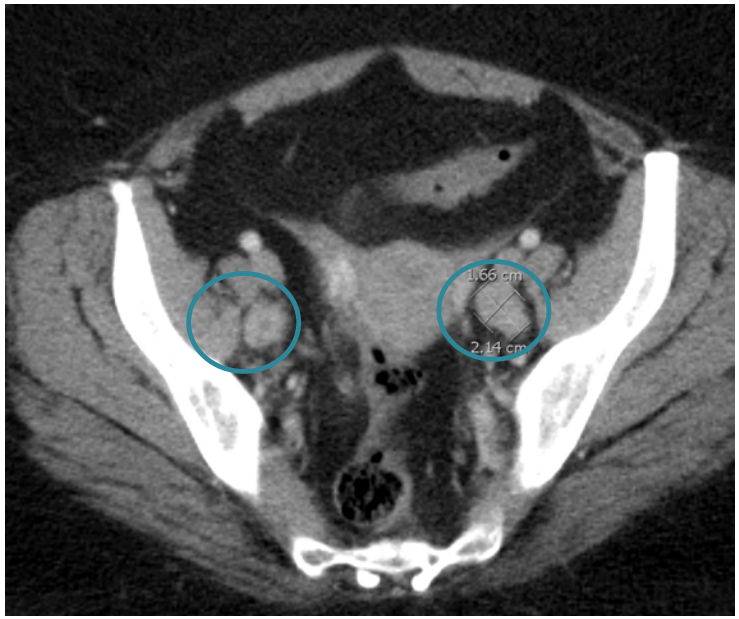
Normal node



Central necrosis

Rounded shape

Irregular margins

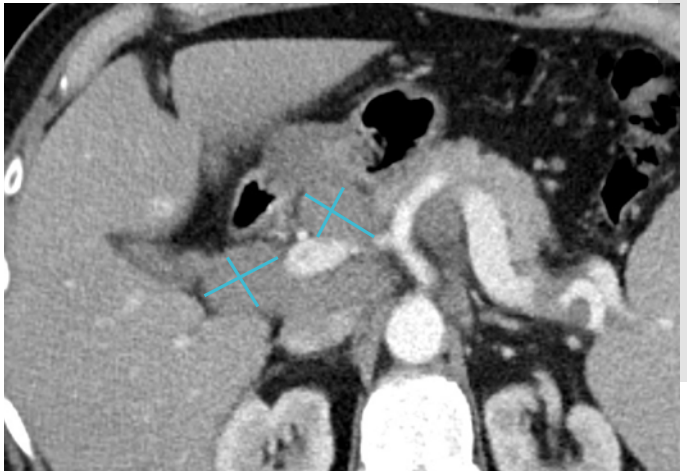


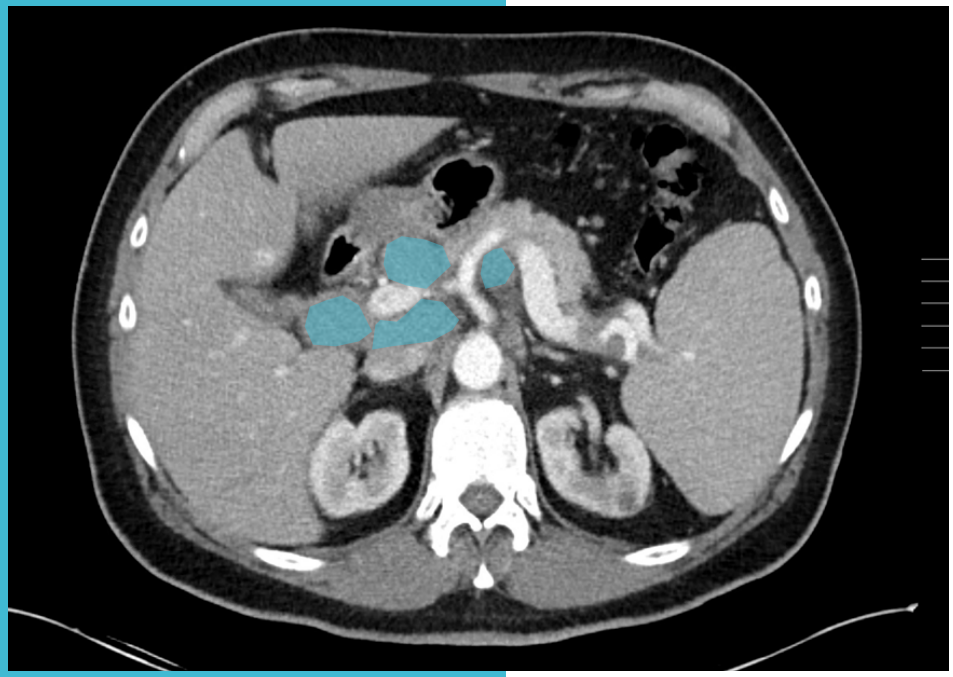

Cervical cancer

- Enlarged nodes
- Central necrosis
- Irregular margins

# Things to note

- Abnormal lymph nodes
  - Diffusely enlarged: Short axis greater than 1 cm
  - Multiple nodal stations = systemic process
- Ddx diffuse adenopathy
  - Lymphoma
  - Infectious (tuberculosis)
  - Inflammatory (sarcoidosis)





Right upper quadrant adenopathy
- Periportal
- Peripancreatic
- Portocaval

Retroperitoneal adenopathy
- Retrocaval
- Aortocaval
- Para-aortic

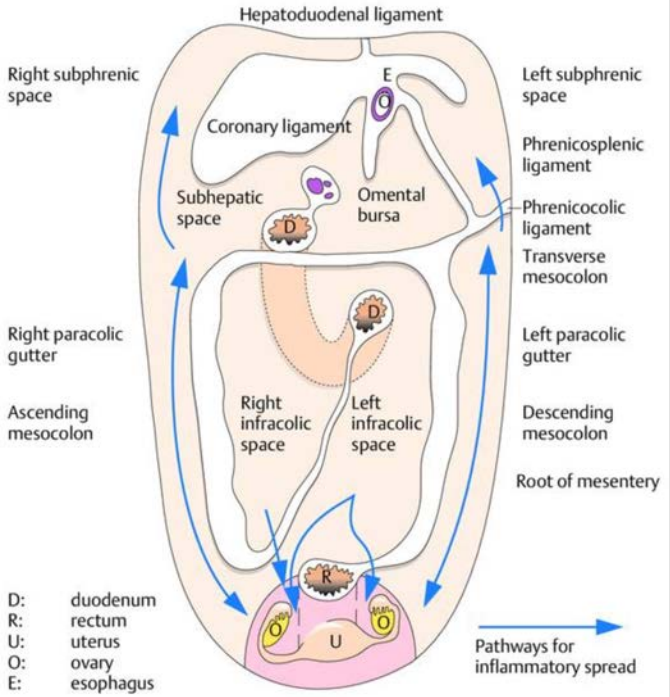
Common iliac adenopathy

External iliac/deep inguinal adenoapthy

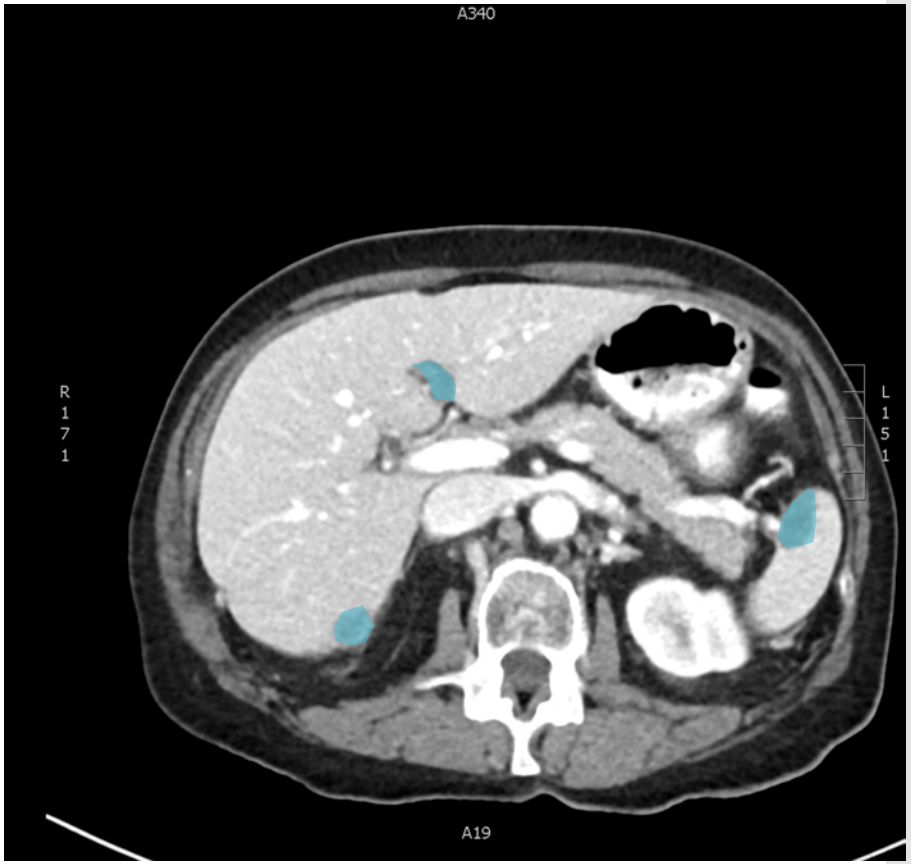
# Case 5

# Things to notice

- Pattern of spread: Peritoneal disease
  - Disease will layer "stick" along peritoneal reflections
- Typically seen with
  - Ovarian cancer
  - Appendiceal cancer
  - Primary peritoneal
  - Pancreatic cancer
  - Non malignant causes: TB

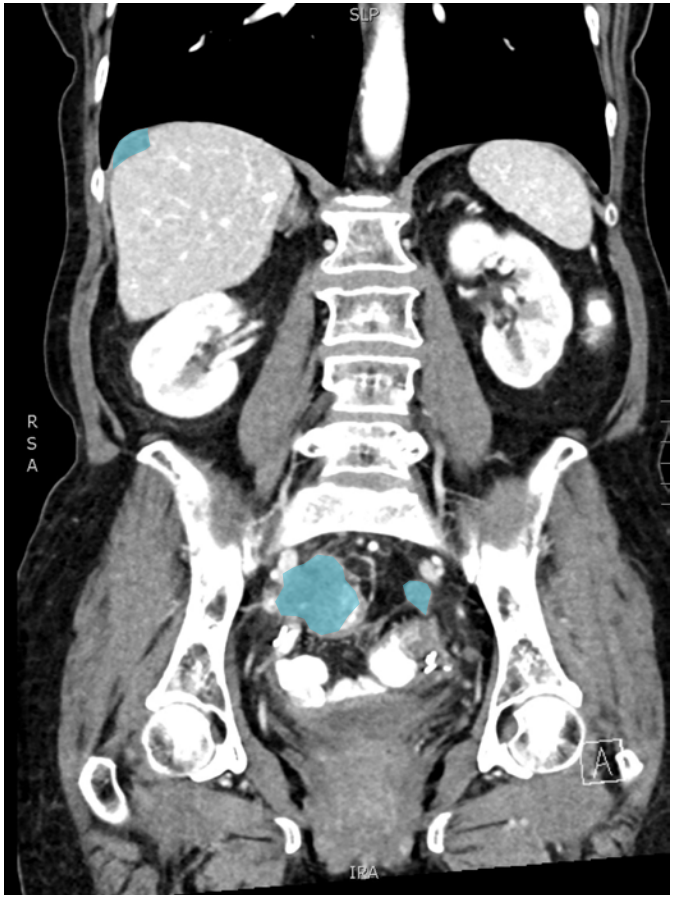


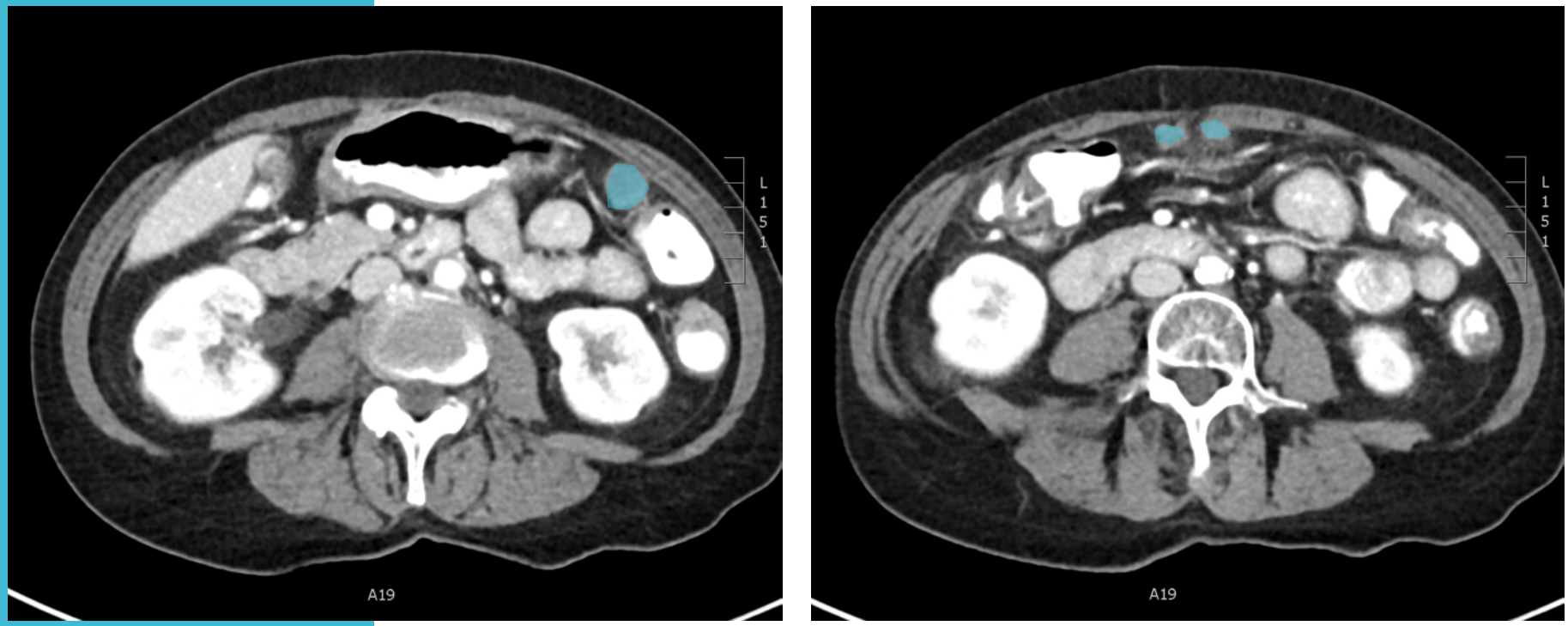

https://radiologykey.com/

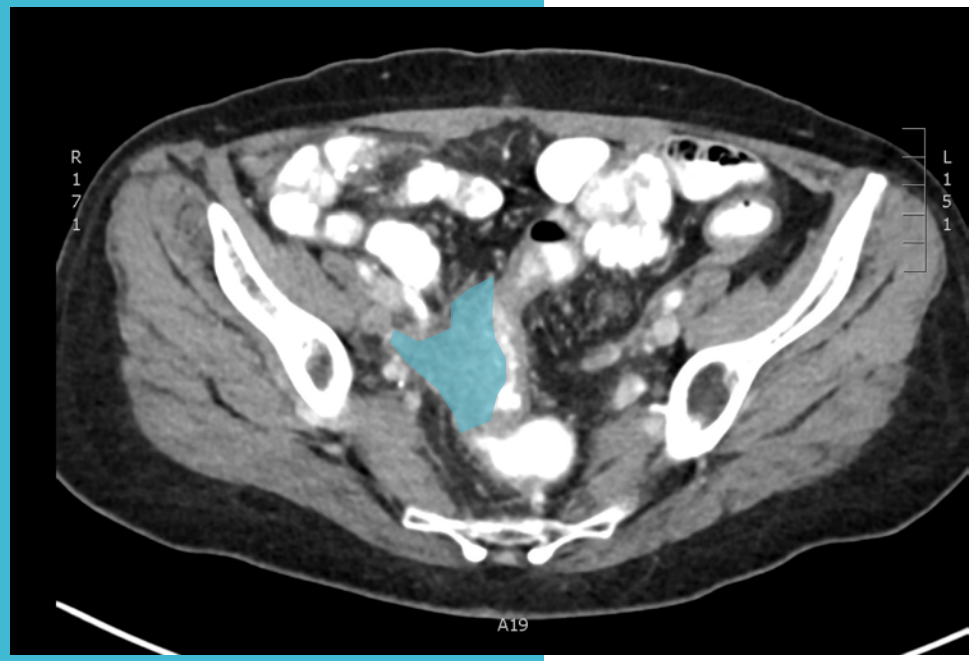

Capsular implants along the hepatic and splenic capsule (peritoneal surfaces)

# Coronal imaging can help visualize capsular implants

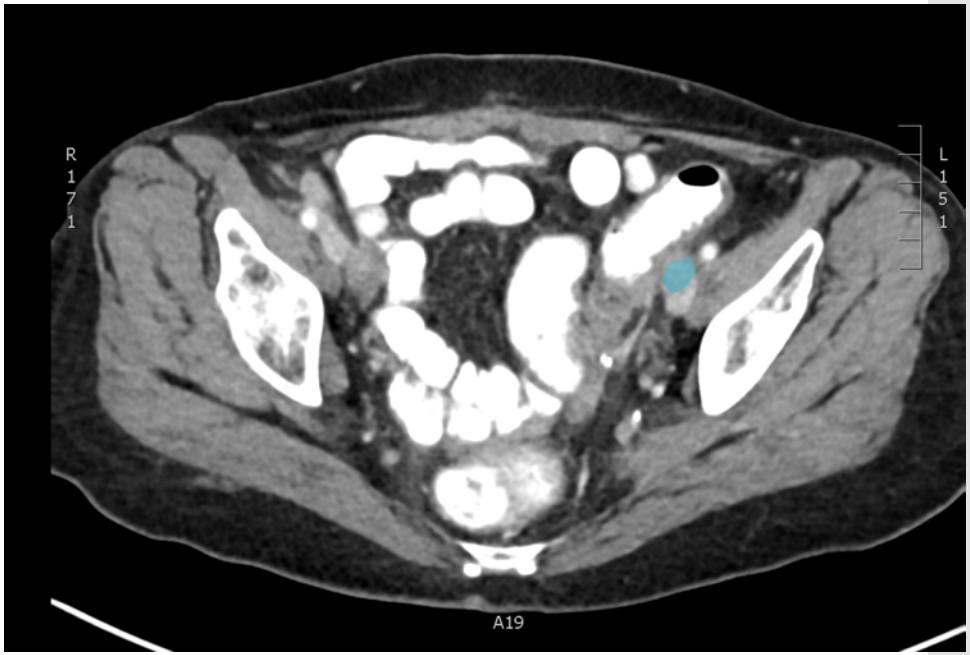






Implants present in the omentum

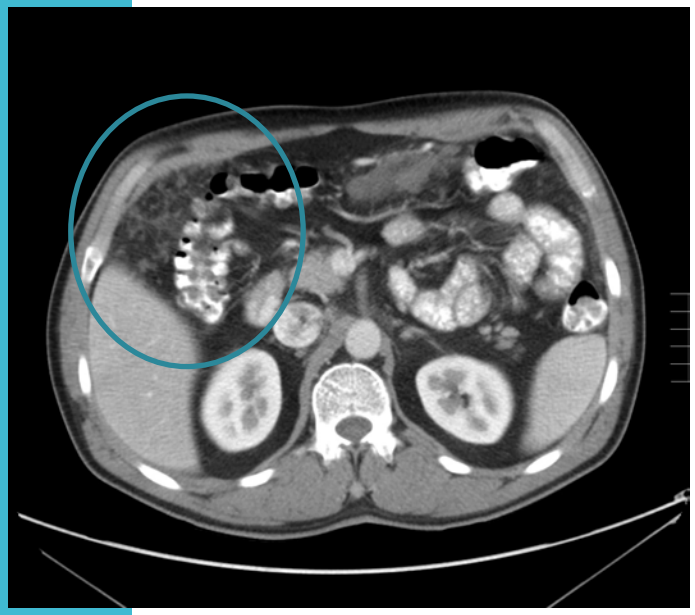


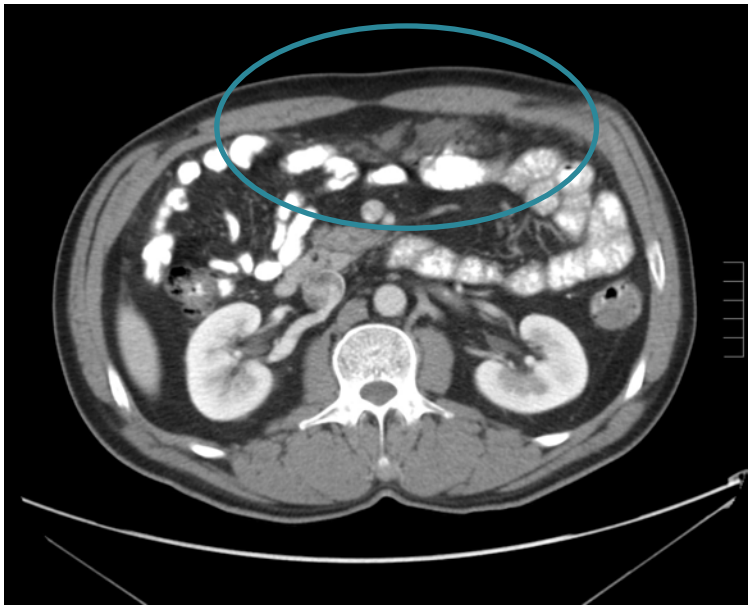

Implant along the sigmoid colon




Enlarged right external iliac lymph node

# Other examples of peritoneal disease



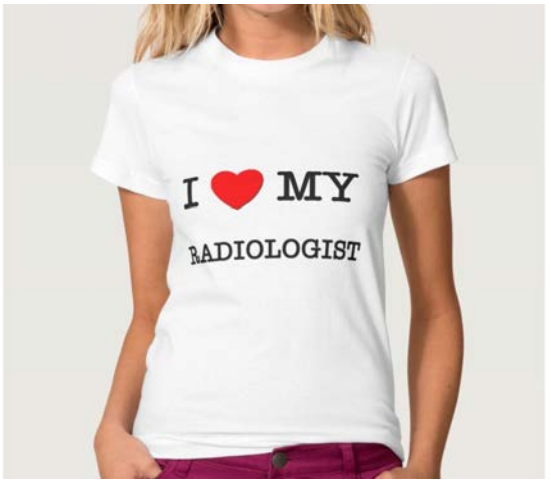


- We are done with cases!

# Search Pattern

- Keep a consistent search pattern
- Lung windows
- Liver windows: High contrast for evaluation of the solid organs
  - Order: Liver/gallbladder, spleen, pancreas, adrenals, kidneys
- Soft tissue windows: "Workhorse" of abdominal imaging
  - Solid organs, bowel, peritoneum and retroperitoneum, soft tissues
- Bone windows
  - Evaluated bones for fractures, lesions, degenerative changes, etc

# Hopes and dreams




- Start looking at every CT you order
- Ask questions (we aren't scary!)
- In time, you are able to start to find the abnormalities

  REMEMBER, this is a 5-year process for residents and fellows. Be patient with yourself.

# Let's revisit: Goals and Objectives

- Discuss the process of using a search pattern in evaluating CT results
- Review basic abdominal anatomy by CT
- Identify common presentations of metastatic disease on CT scan

# Poll Everywhere Question #4

- What is the most important approach to reading abdominal CT?

A. Use your window and levels to better evaluate visceral organs
B. Establish a search pattern and use it every time
C. Look at several CTs to establish normal variants
D. All of the above

# Poll Everywhere Question #4

- What is the most important approach to reading abdominal CT?

A. Use your window and levels to better evaluate visceral organs
B. Establish a search pattern and use it every time
C. Look at several CTs to establish normal variants
D. **All of the above**

# Poll Everywhere Question #5

- I now feel empowered to start looking at the abdominal CT exams that I order.

A. YES!

B. YES! YES! YES!

# Poll Everywhere Question #5

- I now feel empowered to start looking at the abdominal CT exams that I order.

A. YES!

B. **YES! YES! YES!**

# Future Directions

- Chest CT
- MRI
- Ultrasound
- Fun interactive talk with difficult cases submitted by all of you!

# Thank you!

Please send us feedback.

THANK YOU!

University Cancer Research Fund

UNC | LINEBERGER COMPREHENSIVE CANCER CENTER

# UNC Lineberger Cancer Network

## The Telehealth Team

**Tim Poe,** *Director*
**Mary King,** *Operations Coordinator*
**Veneranda Obure,** *A/V Support Engineer*
**Jon Powell, PhD,** *Continuing Education Specialist*
**Oliver Marth,** *Technology Support Technician*
**Jason Paylor,** *Technology Support Technician*

# UPCOMING LIVE LECTURES

**RESEARCH TO PRACTICE**

Live Lecture

***September 22***

***12:00 PM***

Lymphoma Management Updates for 2021

**Anne W. Beaven,** MD

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**ADVANCED PRACTICE PROVIDER**

Live Lecture

***October 20***

***4:00 PM***

Common Infectious Disease Conundrums in Cancer

**Tessa M. Andermann,** MD, MPH

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**ADVANCED PRACTICE PROVIDER**

Live Lecture

***November 17***

***4:00 PM***

Promoting Effective Communication and Advance Care Planning for Patients with Cancer

**Gary Winzelberg,** MD, MPH

*Complete details on upcoming LIVE events:*

**www.unclcn.org/liveevents**

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RESEARCH TO PRACTICE
Self-Paced, Online Course

## Overview of CAR-T Cells and Toxicities

**Natalie Grover,** MD
**Faith Brianne Buchanan,** PA-C

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PATIENT CENTERED CARE
Self-Paced, Online Course

## Integrative Medicine and Cancer Care

**Denise Spector,** PhD, MPH, ANP, RYT

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ADVANCED PRACTICE PROVIDER
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## Oral Complications Associated with Cancer Therapy: Identification and Practical Approaches

**Ali Shazib,** DMD

Today's lecture will be available in ***October*** *2021* as a ***FREE***, Self-Paced, Online Course

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THANK YOU FOR PARTICIPATING!

## UNC Lineberger Cancer Network

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