Kidney cases

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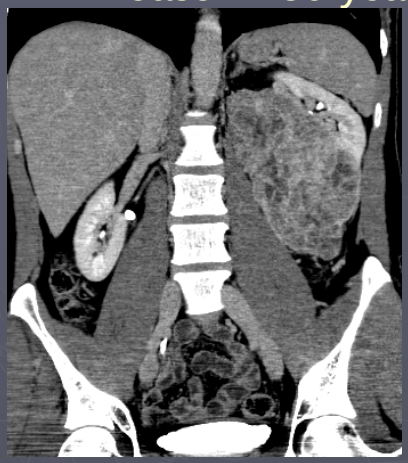
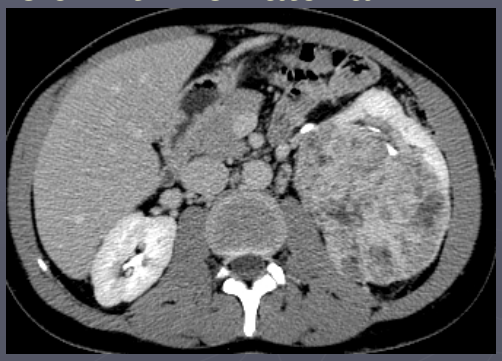
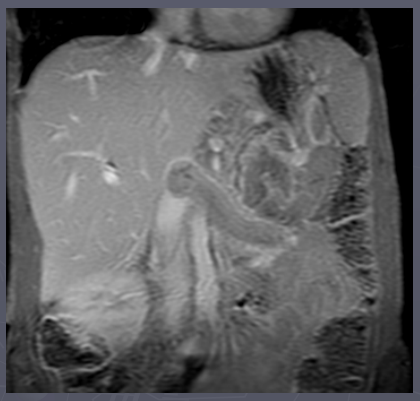
Case 1: 50 year old with hematuria

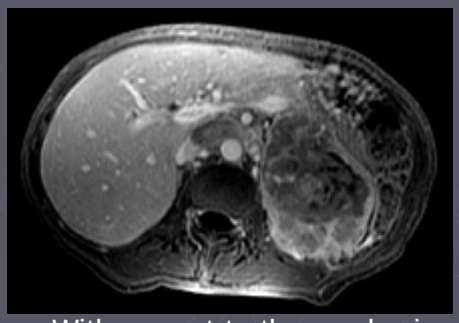




- What is the most likely diagnosis?
  - A: Angiomyolipoma
  - B: Renal lymphoma
  - C: Oncocytoma
  - D: Renal cell carcinoma

Case 1: RCC- clear cell



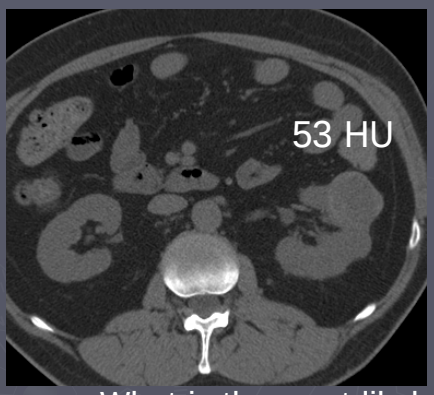


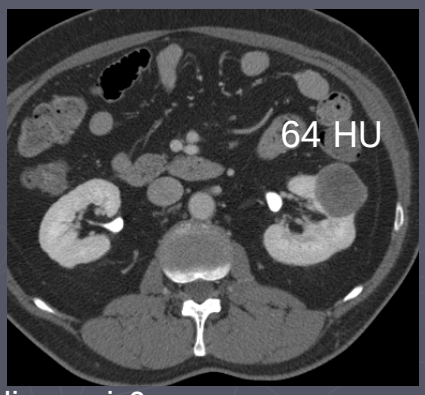
- With respect to the renal vein and IVC findings, what is the minimum tumor stage?
  - Stage 1
  - Stage 2
  - Stage 3
  - Stage 4

Case 1: RCC- clear cell

- Accounts for 65% of RCC cases
  - Defects in the VHL tumor suppressor gene account for 60% of sporadic cases (even without in patients without VHL).
  - Peak age: 60-70yrs
  - 15% multicentric
- Typically heterogeneous mass with avid enhancement
  - 15% with cystic component
  - Frequent necrosis
  - 30% with calcification, typically dense or amorphous Lipid rich cytoplasm may results in signal loss on out of phase MRI imaging
- Renal vein and/or IVC invasion is considered stage 3 disease (Robson and TNM systems)

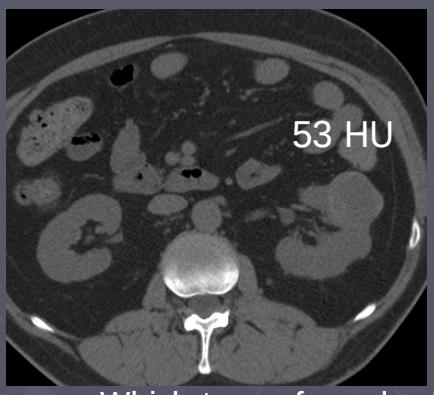
Case 2: 55 y/o with incidental renal lesion

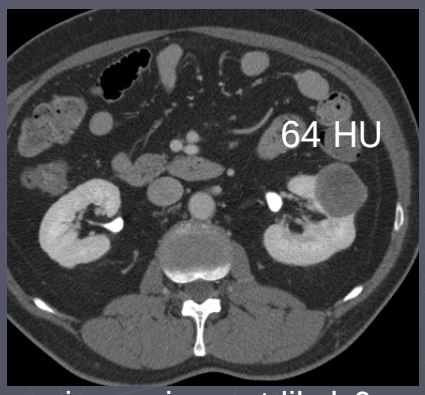




- What is the most likely diagnosis?
  - A: Hemorrhagic renal cyst
  - B: Lipid poor angiomyolipoma
  - C: Renal cell carcinoma
  - D: Transitional cell carcinoma

Case 2: 55 y/o with incidental renal lesion



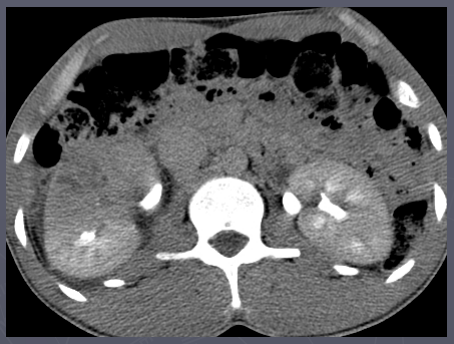


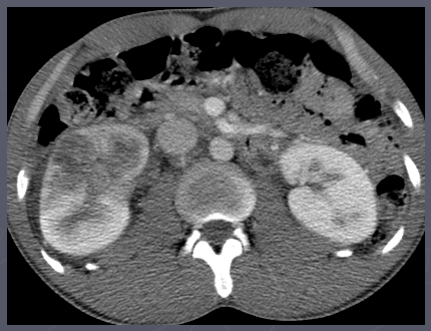
- Which type of renal cell carcinoma is most likely?
  - A: Chromophobic RCC
  - B: Clear cell RCC
  - C: Papillary RCC
  - D: Medullary RCC

Case 2: Papillary RCC

- Second most common subtype of RCC (10-15%)
- Least enhancing type of renal neoplasm
  - Cyst should not increase more than 10HU post contrast
  - 10-20HU increase is suspicious
  - Ultrasound may be helpful to distinguish a cyst from a solid mass in equivocal cases
- Homogeneous relatively low signal on T1 and T2 compared to Clear cell RCC.

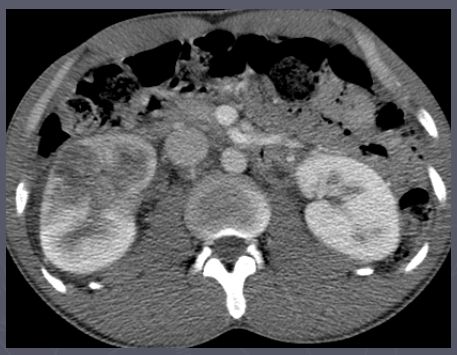
Case 3: 30 year old male recently immigrated from Nigeria now with weight loss and low grade fever.

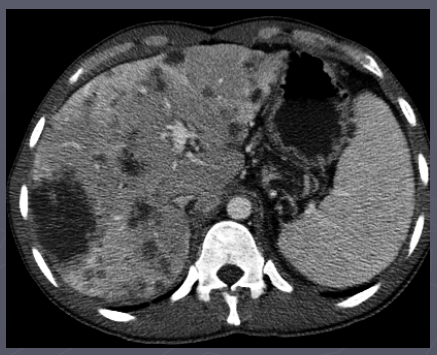




- What is the most likely diagnosis?
  - A: Renal cell carcinoma
  - B: Transitional cell carcinoma
  - C: Renal tuberculosis
  - D: Papillary necrosis due to sickle cell disease.

Case 3: 30 year old male recently immigrated from Nigeria now with weight loss and low grade fever.





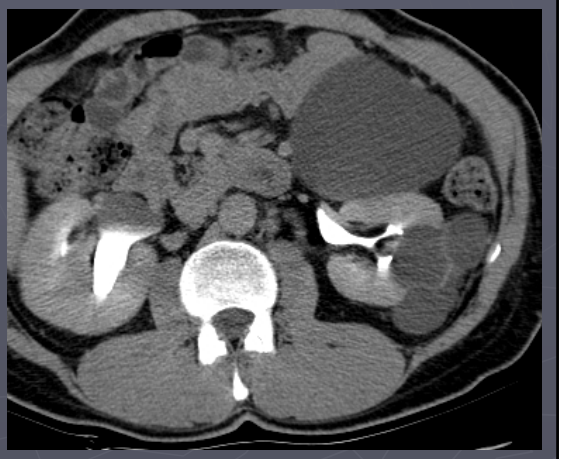
- Two months later, the previously normal liver now has this appearance and there are several new lung nodules. Now what is the most likely diagnosis?
  - A: Renal cell carcinoma
  - B: Transitional cell carcinoma
  - C: Renal tuberculosis
  - D: Papillary necrosis due to sickle cell disease.

Case 3: Medullary renal cell carcinoma

- Arises from proliferating cells of the collecting duct epithelium near the papilla
  - Infiltrative mass
  - Hemorrhage, necrosis, lymphadenopathy are common
- Occurs almost exclusively in young adult patients with sickle cell trait
  - More common on right (70%)
  - M > F
  - Extremely aggressive
    - Median survival: 3 months

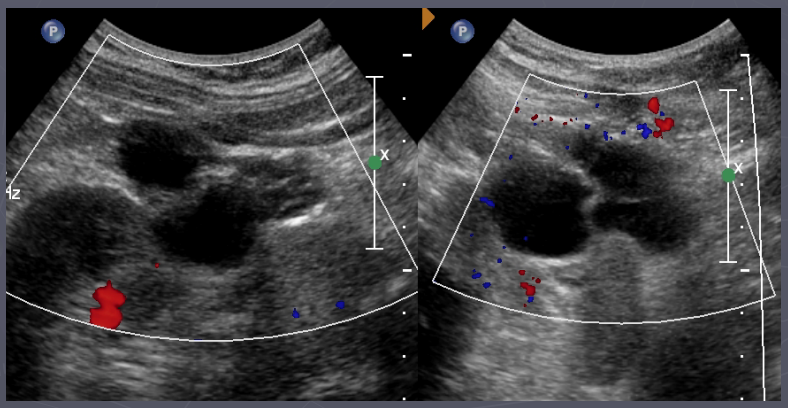
Case 4: 42 year old female with incidental renal lesion

- Which of the following are true of this type of lesion?
  - A: Communicates with collecting system
  - B: Also found in male children
  - C: Readily distinguished from RCC by thin septations
  - D: Associated with development of CNS subcortical tubers.



Case 4: 42 year old female with incidental renal lesion

- 3 year follow-up ultrasound: The lesion is unchanged.

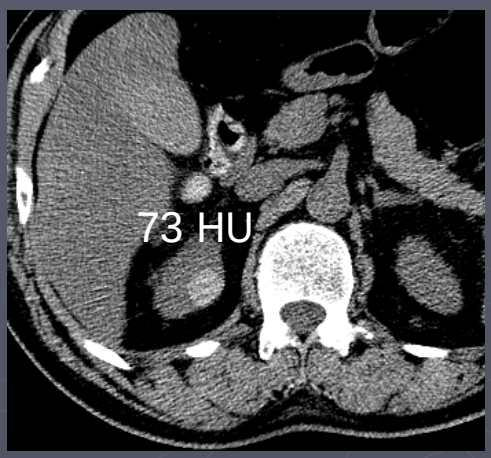


Case 4: Multilocular cystic nephroma

- Benign neoplasm
  - Bimodal age distribution
    - Male children < 4 yrs old
    - Female adults > 40 yrs old
- Well defined multilocular cystic mass
  - Cysts of variable size
  - Enhancing septations
  - Nodularity and calcifications are uncommon
  - May herniate into the renal pelvis
  - Cysts may be hemorrhagic or proteinaceous
- Difficult to reliably differentiate from cystic RCC
  - Consider patient demographic
  - Absence of nodularity , coarse calcifications, or irregular septations may allow for close imaging surveillance to ensure stability

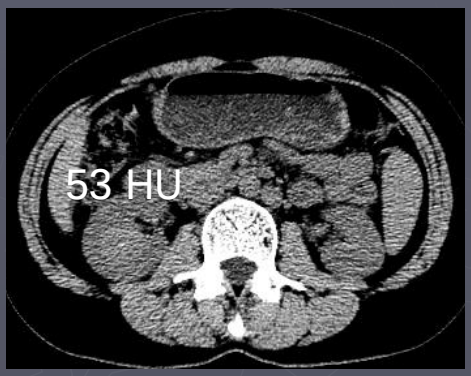
Case 5: Incidental finding on CT for blunt abdominal trauma

- What is the diagnosis?
  - A: Oncocytoma
  - B: Lipid poor angiomyolipoma
  - C: Hyperdense cyst
  - D: Cortical nephrocalcinosis

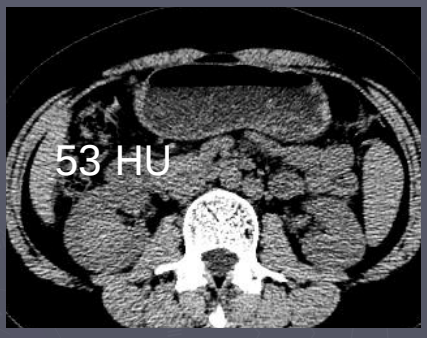


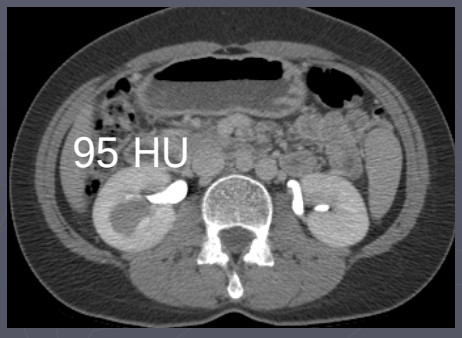
Case 5: Hyperdense cyst

- What is the diagnosis?
  - A: Hemorrhagic cyst
  - B: Hyperdense proteinaceous cyst
  - C: Lipid poor AML
  - D: Indeterminate



Case 5: Hyperdense cyst pitfall



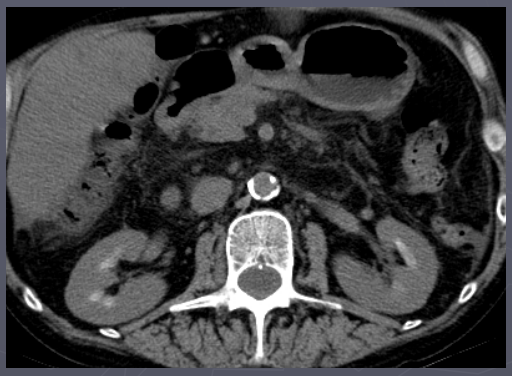


Case 5: Hyperdense cyst

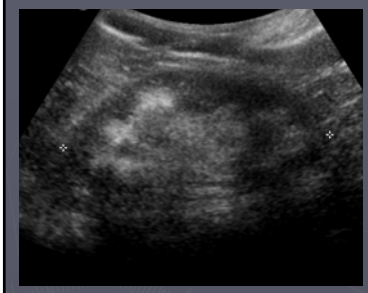
- Bosniak 2 cyst: Benign, no follow-up
  - Typically contain proteinaceous material
  - > 20 HU
    - > 70 HU on non con CT: 99.9% benign.
    - 20-70 HU on non con CT is indeterminate
  - < 3 cm
  - Homogeneous.
  - Non enhancing (20 HU threshold)
  - Portal venous phase contrast-enhanced CT: > 70 HU or internal heterogeneity favor renal cell carcinoma.

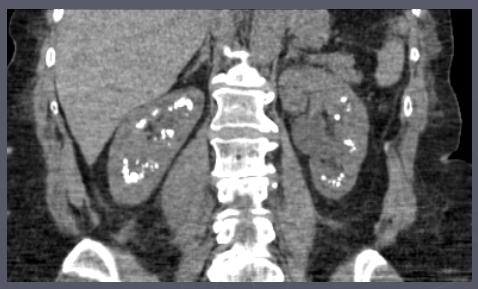
Case 6: History of frequent renal stone passage

- What is the diagnosis?
  - A: Medullary nephrocalcinosis
  - B: Acute tubular necrosis
  - C: Balkan nephropathy
  - D: lithium nephropathy



Case 6: Medullary nephrocalcinosis



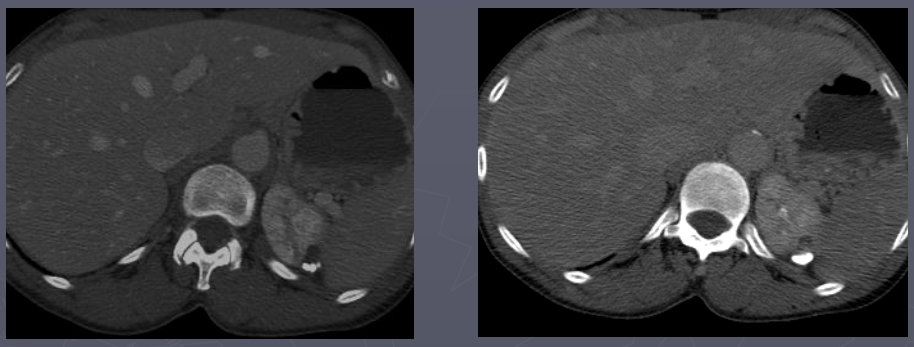


- What is a potential etiology?
  - A: Prior tuberculosis infection
  - B: Recent episode of profound hypotension requiring pressor support
  - C: Urinary stasis due to bladder outlet obstruction.
  - D: Patient lives in Seattle and supplements Vitamin D at 60,000 IU/day through the winter.

Case 6: Medullary nephrocalcinosis

- Imaging features
  - Central in location- spares the cortex.
  - Bilateral with stippled calcifications in medullary distribution.
  - Echogenic pyramids on ultrasound.
- Common etiologies
  - Hyperparathyroidism (40%)
  - Renal tubular acidosis type 1 (20%)
  - Medullar sponge kidney (20%)
  - Other
    - Milk alkali syndrome
    - Hypervitaminosis D
- Prone to collecting system stone formation.

Case 7: Recurrent UTIs



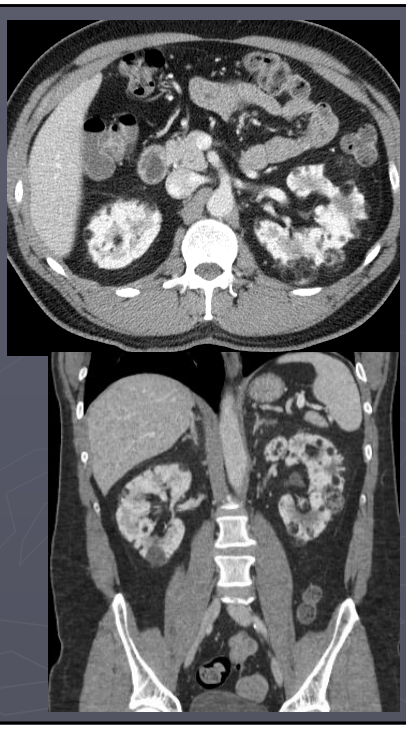
- What is the diagnosis?
  - A: Bosniak 3 cyst with coarse nodular calcifications
  - B: Renal abscess
  - C: Calyceal diverticulum
  - D: Bosniak 2 cyst with milk of calcium

Case 7: Calyceal diverticulum

- Urine containing cystic cavity connected to intrarenal collecting system.
  - Lined by transitional cell epithelium
  - Type I: Communicates with minor calyx
  - Type II: Communicated with major calyx/renal pelvis
- 50% contain milk of calcium or calcified stones.
  - May be mistaken for calcified cystic renal mass.
- Patient at increased risk for recurrent infection due to urinary stasis and stone formation.
- Diverticulum typically fills with contrast on delayed phase CT imaging.
  - In some cases the neck of the diverticulum may be small or compressed, preventing filling except during retrograde evaluation.

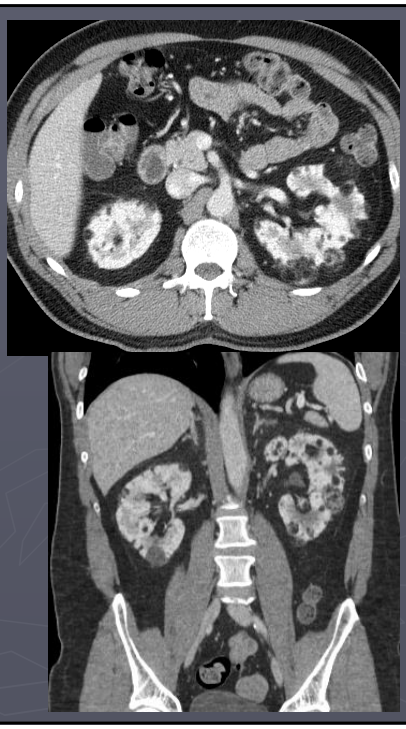
Case 8: 20 year old with seizures

- What hereditary syndrome does this patient have?
  - A: Birt Hogg Dube
  - B: von Hippel Lindau
  - C: Tuberous Sclerosis
  - Osler Webber Rendu



Case 8: Tuberous sclerosis

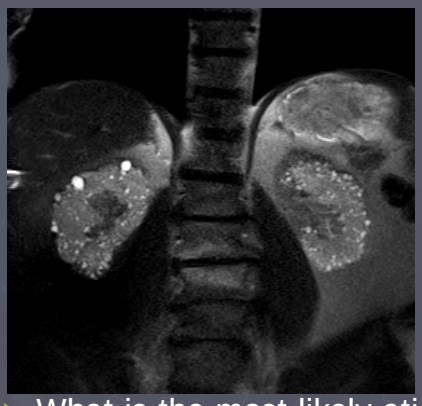
- What is the primary clinical concern for these lesions?
  - A: Malignant degeneration
  - B: Infection
  - C: Hemorrhage
  - D: End stage renal failure.

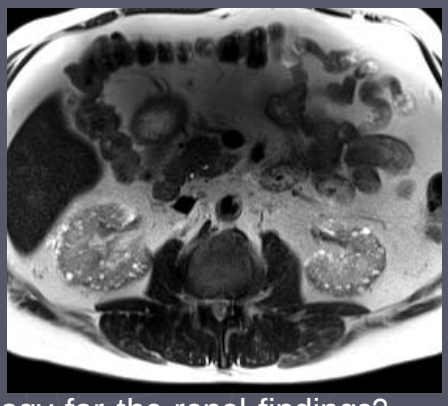


Case 8: Tuberous sclerosis/Angiomyolipoma

- Autosomal dominant neurocutaneous syndrome
  - Hamartoma formation
    - Cortical tubers, subependymal nodules, lung cysts, renal and hepatic angiomyolipomas, renal cysts
  - Increased risk for clear cell type RCC (2-4% of TS patients)
- Renal angiomyolipomas (AMLs) present in 80%
  - Hamartoma containing varying amounts of fat, smooth muscle, and abnormal blood vessels.
  - Macroscopic fat is a hallmark imaging feature. Microscopic fat is less reliable- clear cell RCC can have signal loss on out of phase MRI.
  - Lipid poor AMLs are difficult to distinguish from RCC.
    - Calcification is atypical: consider RCC.
  - Size >4cm or internal aneurysm >5mm associated with increased risk of hemorrhage (can be life threatening).
  - Significant minority of lesions affected by estrogen/progesterone and may grow during pregnancy.

Case 9: 63 year old homeless male with low GFR





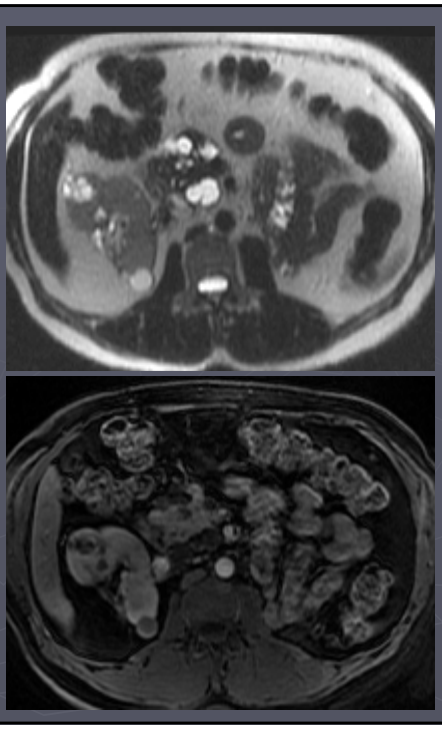
- What is the most likely etiology for the renal findings?
  - A: ESRD on dialysis
  - B: Chronic consumption of alkali metal salt
  - C: Autosomal recessive polycystic kidney disease
  - D: Autosomal dominant polycystic kidney disease

Case 9: Lithium nephropathy

- Develops in 33-62% of patients undergoing long-term (10-20yrs) treatment with lithium salts.
  - Lithium damages renal tubuli resulting in chronic interstitial nephritis, cortical and medullary fibrosis, tubular dilatation, and cyst formation.
- Cysts are located in both the cortex and the medulla.
  - Uniform, symmetric distribution.
  - Numerous. The number of cysts not clearly correlated with GFR impairment.
- Small, simple appearing. Usually 1-2mm.
- Normal size kidneys

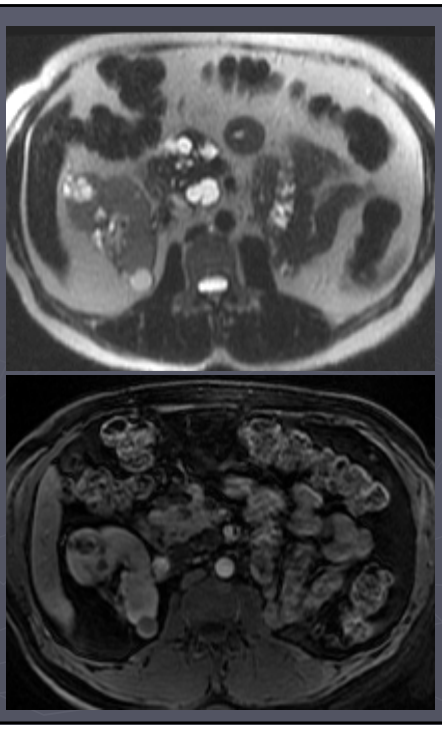
Case 10:

- What hereditary syndrome does this patient have?
  - A: Birt Hogg Dube
  - B: von Hippel Lindau
  - C: Tuberous Sclerosis
  - Osler Webber Rendu



Case 10:

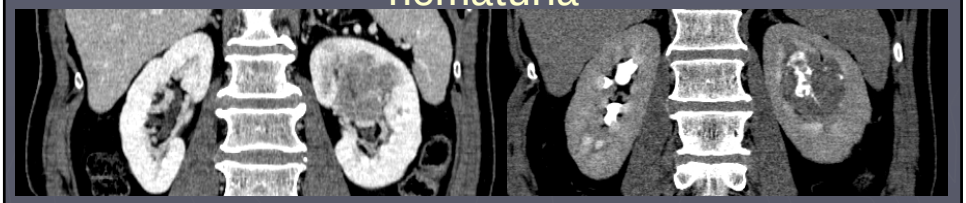
- With respect to the kidneys, what are these patients most at risk of developing?
  - A: Chromophobe RCC
  - B: Papillary RCC.
  - C: Clear cell RCC
  - D: Oncocytoma



Case 10: von Hippel Lindau (VHL)

- The most common cause of hereditary RCC
  - Autosomal dominant.
  - Often multiple and bilateral RCCs.
- Approximately 50% of deaths due to RCC.
  - Annual ultrasound screening recommended beginning at age 10.
- Multiple cysts develop in the kidneys lined with hyperplastic or metaplastic clear cells.
  - Most cysts have thin walls with possible thin septations and no enhancement.
  - Developing RCC will manifest as septal thickening, enhancement, and/or small mural nodularity.

Case 11: 65 year old male diabetic with hematuria

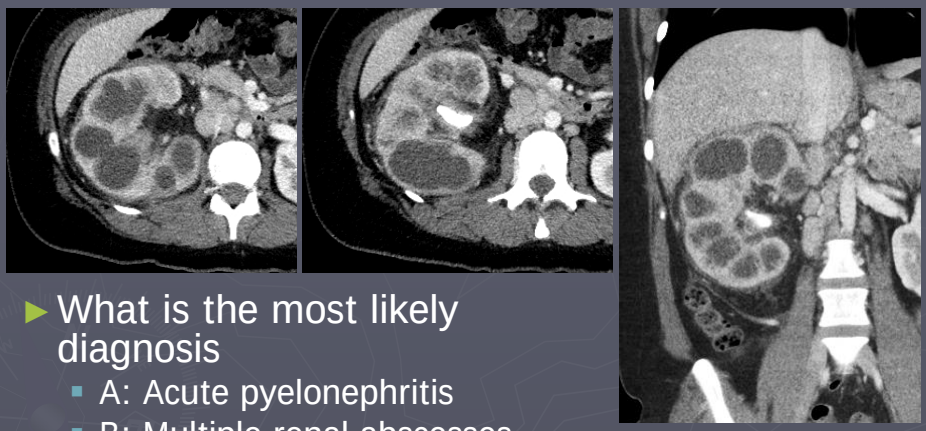


- What is the most likely diagnosis?
  - A: Chromophobic RCC
  - B: Papillary necrosis
  - C: Transitional cell carcinoma
  - D: Collecting duct carcinoma

Case 11: Transitional cell carcinoma

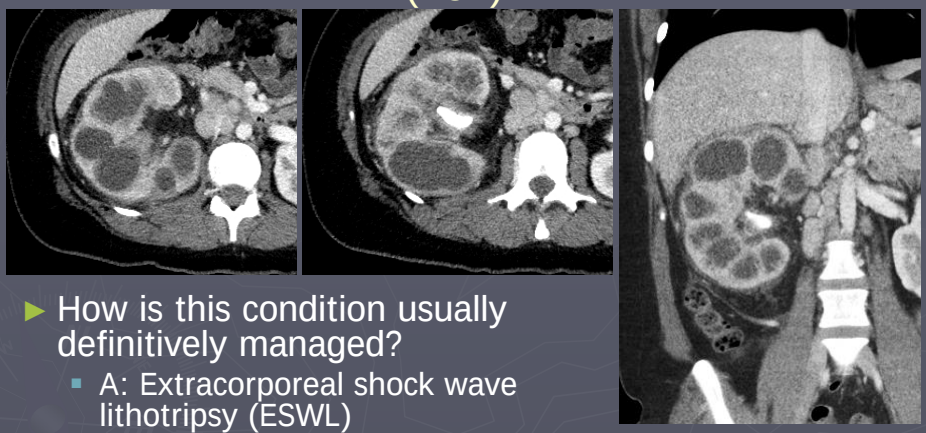
- Most common urothelial neoplasm, 2nd most common renal malignancy
  - Majority (85%) are low grade, superficial, papillary tumors
  - 15% are more aggressive tumors that may spread by mucosal extension, hematogenous or lymphatic invasion
  - Upper tract TCC develops in 2-4% of bladder cancer patients
- Hypoenhancing to renal parenchyma
  - May be difficult to differentiate from medullar on corticomedullary contrast phase
  - Ill defined interface with surrounding renal parenchyma on nephrographic phase
  - Sessile filling defect in the excretory phase
  - Focal calyceal dilation
- MR imaging is uncommonly used for the primary assessment of upper tract TCC
  - May be nearly isointense to renal parenchyma on T1 and T2 weighted sequences
  - Lower signal intensity than urine on T2-weighted images (static MR urography)

Case 12: 45 year old female with anemia, fever, and malaise.



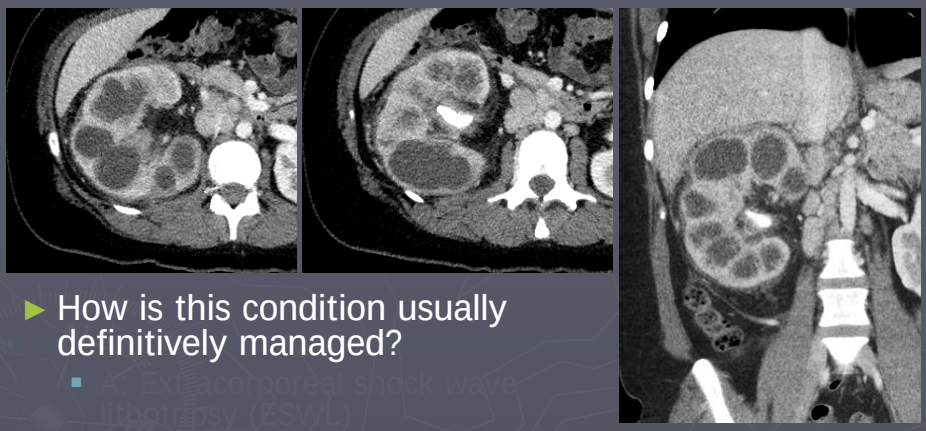
- What is the most likely diagnosis
  - A: Acute pyelonephritis
  - B: Multiple renal abscesses
  - C: Xanthogranulomatous pyelonephritis
  - D: Polycystic kidney disease

Case 12: Xanthogranulomatous pyelonephritis (XGP)



- How is this condition usually definitively managed?
  - A: Extracorporeal shock wave lithotripsy (ESWL)
  - B: 3-6 months antibiotics
  - C: Nephrectomy
  - D: Percutaneous nephroureterostomy.

Case: Xanthogranulomatous pyelonephritis (XGP)



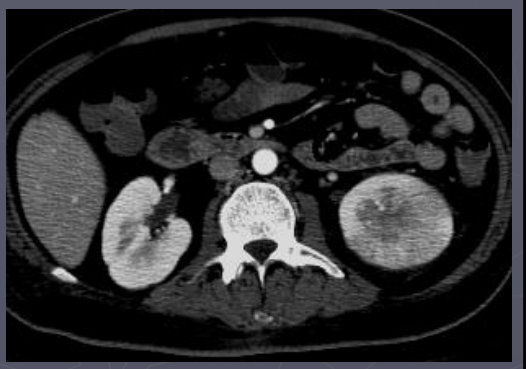
- How is this condition usually definitively managed?
  - A: Extracorporeal shock wave lithotripsy (ESWL)
  - B: 3-5 months antibiotics
  - C: Nephrectomy
  - D: Percutaneous nephroureterostomy.

Case 12: Xanthogranulomatous pyelonephritis (XGP)

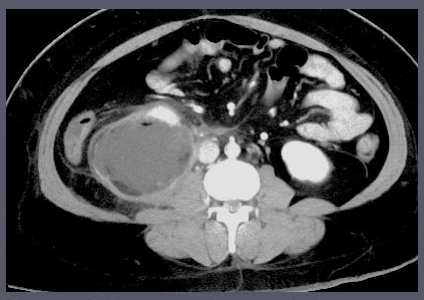
- Chronic suppurative infection
  - Most common in females age 45-65
  - Characterized by renal parenchyma destruction
    - Replacement of parenchyma with lipid laden macrophages
    - Enlarged, poorly functioning kidney
    - Multiple roughly fluid attenuation regions- "xanthomatous masses".
  - Staghorn calculus common- causes obstruction and inflammatory response
    - Congenital UPJ obstruction or ureteral tumors are less common.
  - Definitive treatment is nephrectomy
    - Antibiosis not typically effective in isolation

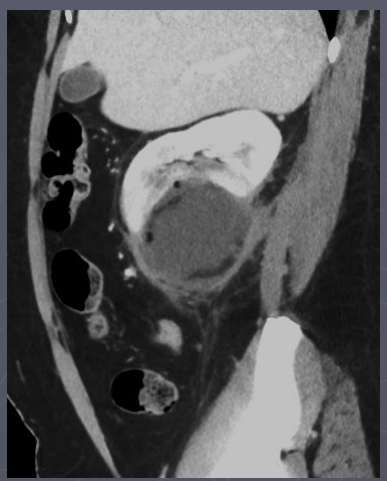
Case 13: 25 year old presenting with flank pain and fever

- What is the diagnosis?
  - A: Pyelonephritis
  - B: Collecting duct carcinoma
  - C: Lymphoma
  - D: Embolic renal infarction



Case 13: Pyelonephritis progressing to renal abscess

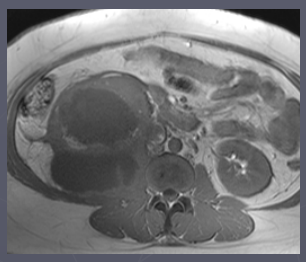
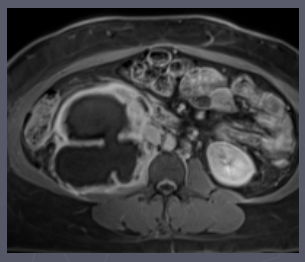
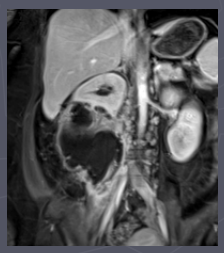
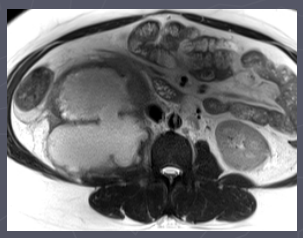




- Pyelonephritis may progress to renal abscess
  - Clinical presentation may be difficult to distinguish from uncomplicated infection
  - Frank pyuria may be present but if abscess is walled of, urinalysis may be normal.

Case 13: Pyelonephritis progressing to renal abscess

- Note small amount of macroscopic fat along posterior margin of the lesion in this case.
  - Likely related to fat necrosis or displaced sinus fat
  - The lesion is not consistent with AML
  - RCC with displaced sinus fat is a consideration
  - Clinical presentation important for prioritizing differential diagnosis

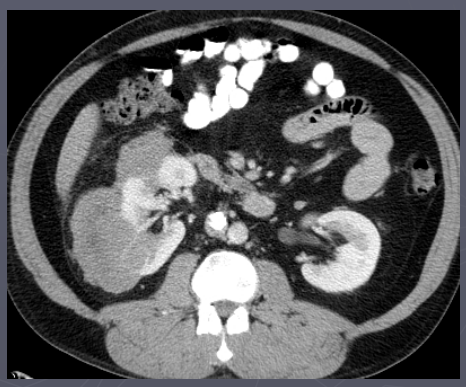





Case 13: Acute pyelonephritis/renal abscess

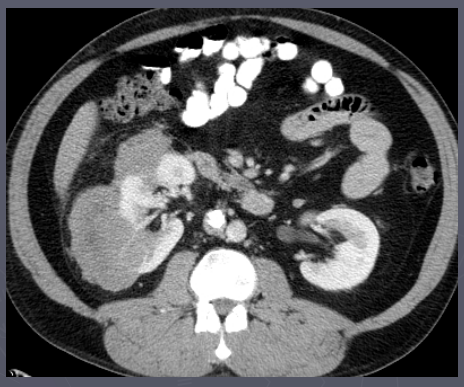
- Pyelonephritis is the most common bacterial infection of the kidneys
  - Typically does not lead to morphologic damage
  - Imaging normal in up to 75% of cases.
  - Imaging findings:
    - Diffuse renal enlargement
    - Delayed contrast uptake and excretion
      - Striated nephrogram
    - Perinephric stranding
- Abscess usually results from coalescence of micro abscesses in acute pyelonephritis
  - Gram negative is most common
  - Vasospasm and inflammation in pyelonephritis may result in liquefactive necrosis.
  - Risk factors include:
    - Diabetes
    - IVDA
    - Vesicoureteral reflux
    - Renal calculi
  - Presence of gas is essentially pathognomonic

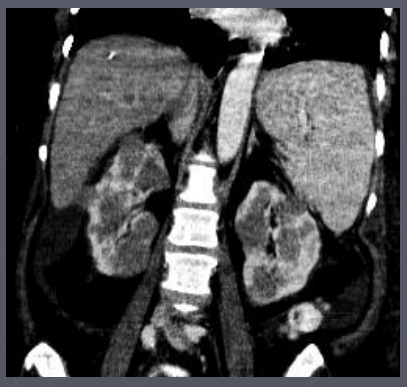
Case 14: 70 year old presenting with weight loss

- What is the most likely diagnosis?
  - A: Metastatic melanoma
  - B: Transitional cell carcinoma
  - C: Lymphoma
  - D: Renal cell carcinoma



Case 14: Lymphoma





- What is most common imaging manifestation of renal lymphoma
  - A: Multiple masses
  - B: Diffuse infiltration
  - C: Isolated mass
  - D: Direct extension from retroperitoneal disease

Case 14: Lymphoma

- Kidneys lack lymphoid tissue
  - Primary renal lymphoma is rare
  - Typically found in the setting of systemic disease
    - 30-60% autopsy
    - 5% at imaging
  - Non Hodgkin's is much more common than Hodgkin's lymphoma
  - Renal lymphoma is particularly common in GVHD, renal transplantation (350 x baseline risk)
- Imaging features:
  - Multiple cortical nodules (most common- 50% of cases)
  - Diffuse infiltration
  - Contiguous extension of retroperitoneal disease
  - Perirenal disease- surrounds kidney without infiltration
    - Essentially pathognomonic

Kidney disease cases: Summary

- Clear cell RCC
- Papillary RCC
- Medullary RCC
- Multilocular cystic nephroma
- Hyperdense cysts
- Medullary nephrocalcinosis
- Calyceal diverticulum
- Angiomyolipoma and tuberous sclerosis
- Lithium nephropathy
- von Hippel Lindau
- Transitional cell carcinoma
- Xanthogranulomatous pyelonephritis
- Acute pyelonephritis and renal abscess
- Renal lymphoma

Thank you!

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