ADRENAL GLANDS & RETROPERITONEUM

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ADRENAL GLANDS & RETROPERITONEUM

ACKNOWLEDGEMENTS
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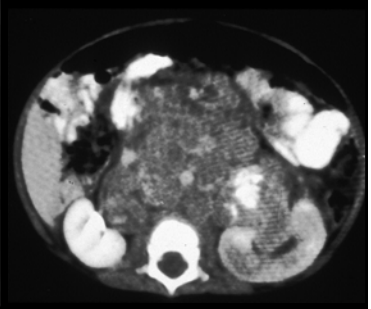
Clinical Professor of Radiology
University of Washington Medical Center
Seattle, WA

Unknown Case

Chest radiograph

Excretory Urogram

18 mo. old with weight loss, irritability



Diagnosis ?

A. Lymphoma
B. Neuroblastoma
C. Wilms' Tumor
D. Leukemia

For comparison:

Wilms' tumor

(median age: 3 1/2 yrs.)

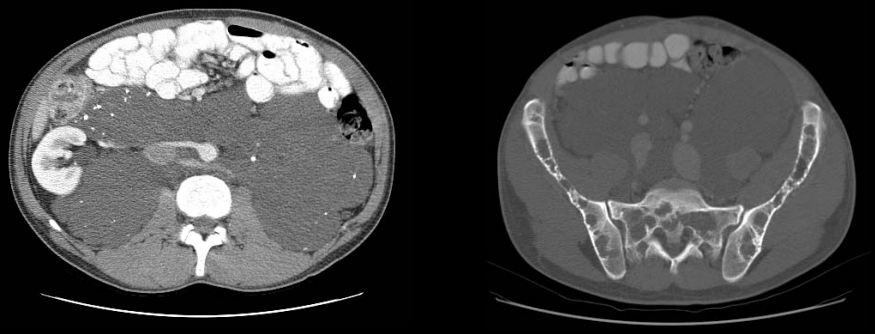
PEDIATRICS

- **Neuroblastoma**
- Calcification > 85%
- Encases vessels
- Crosses midline
- Spinal canal extension
- Metastases:
  - bone common
  - lungs rare

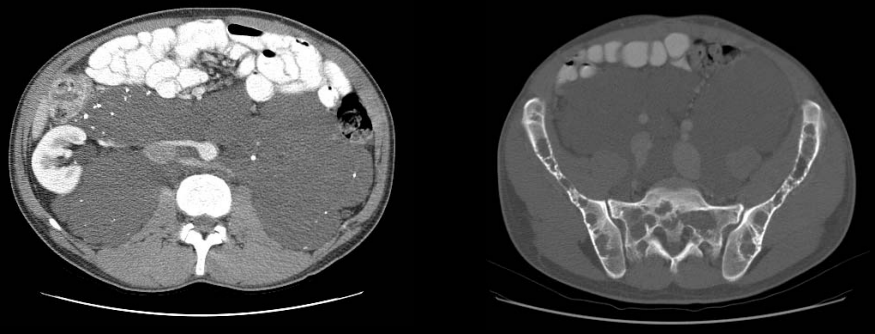
Wilms Tumor

- Calcification=10%
- Displaces vessels
- Doesn't usually cross
- No extension to spinal canal
- Metastases:
  - lungs common
  - bone rare

Unknown Case



35 y.o. male with abdominal fullness and bone pain



Diagnosis ?

A. Non-Hodgkin's lymphoma
B. Lymphangiomatosis
C. Retroperitoneal liposarcoma
D. Metastasis

Unknown case

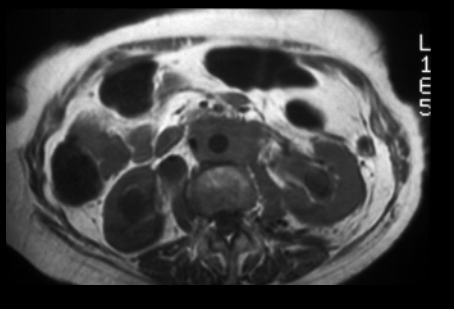
Urogram

Retrograde ureteropyelogram

45 yo female with bilateral flank pain and rising creatinine

Diagnosis ?

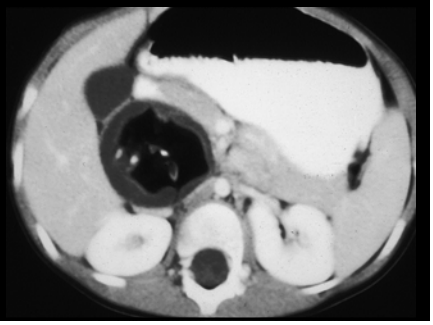
A. Transitional cell CA
B. Retroperitoneal fibrosis
C. Lymphoma
D. Tuberculosis



Unknown Case

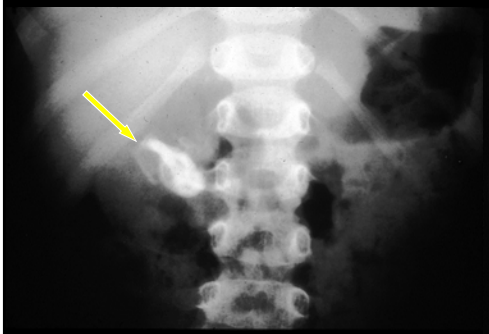
Abdomen radiograph

Contrast-enhanced CT

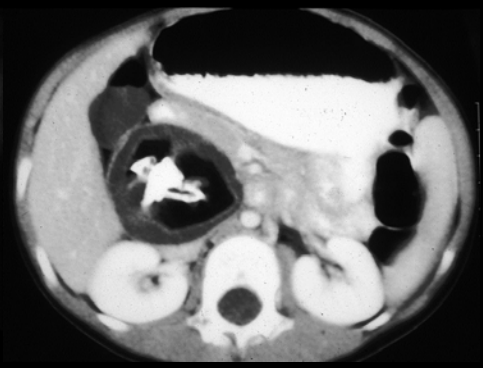


14 month old, mother feels lump

(case continued)



Abdomen radiograph



Contrast-enhanced CT

Diagnosis ?

A. Neuroblastoma
B. Wilms' tumor
C. Retroperitoneal teratoma
D. Angiomyolipoma

Unknown Case

Contrast-enhanced CT

68 y.o. with pelvic pain, dysuria, and hematuria

(continued)

Excretory urogram; 15 min.
(coned view of bladder)

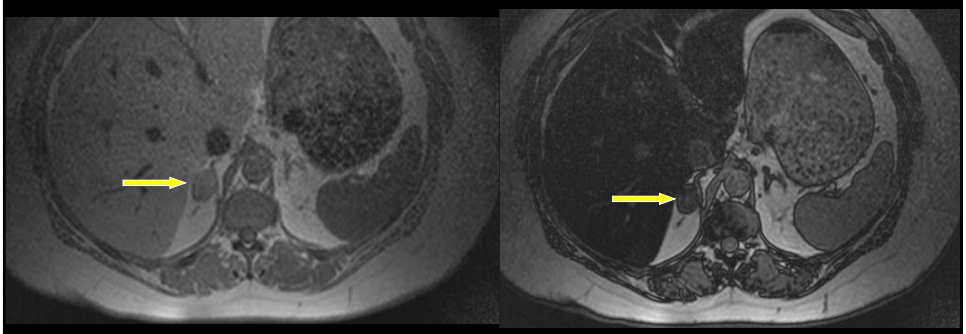
Diagnosis ?

A. TCC of the bladder
B. Diverticulitis
C. Prostate carcinoma
D. Sigmoid carcinoma

ADRENAL

Benign lesions

Unknown Case



Chem. shift: in-phase

Chem. shift: out-of-phase

Diagnosis ?

A. Myelolipoma
B. Adrenal adenoma
C. Adrenal cyst
D. Pheochromocytoma

Case: History of non small cell lung carcinoma

Rt Precontrast = – 10 HU

Lt Precontrast = 20 HU Postcontrast = 120 HU Washout = 50HU

Case: History of non small cell lung carcinoma

Rt Precontrast = – 10 HU

Lt Precontrast = 20 HU Postcontrast = 120 HU Washout = 50HU

Bilateral adrenal adenomas, lipid rich on right, lipid poor on left

Technique

Injection	150 ml contrast at 2 ml/sec
Initial Enhanced attenuation	measured at 60 sec
Delayed attenuation	measured at 15 minutes
Measure	ROI at least 1/2 size of mass

	Sensitivity	Specificity	Likelihood ratio + test	Likelihood ratio - test
% Relative Washout (adenomas > 40%)	82 (59-96)	92 (79-98)	11 (4-32)	0.2 (0.08-0.48)
% Enhancement Washout (adenomas > 60%)	86 (65-98)	92 (79-98)	11 (4-34)	0.15 (0.05-1.4)

n = 166 patients (adenoma 127, nonadenoma 39) (from Caoili et al)*

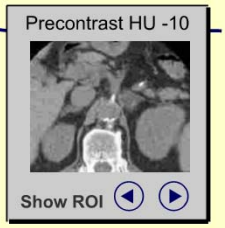
Characterization of Adrenal Masses

Enter Unenhanced CTattenuation value HU

Enter Enhanced CT attenuation value HU

Enter Delayed CT attenuation value HU

Calculate Reset



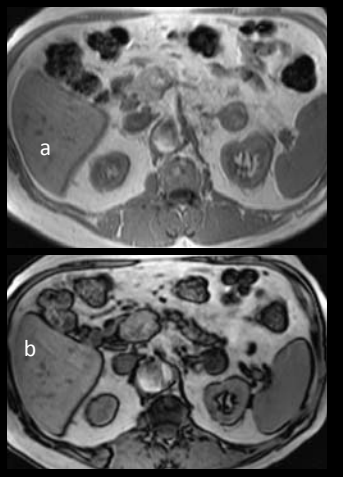
Example Pre- and postcontrast

$$\%\ \text{Relative Washout} = \frac{\text{Enhanced attenuation} - \text{Delayed Attenuation}}{\text{Enhanced attenuation}} =$$

$$\%\ \text{Enhancement Washout} = \frac{\text{Enhanced attenuation} - \text{Delayed Attenuation}}{\text{Enhanced attenuation} - \text{Unenhanced Attenuation}} =$$

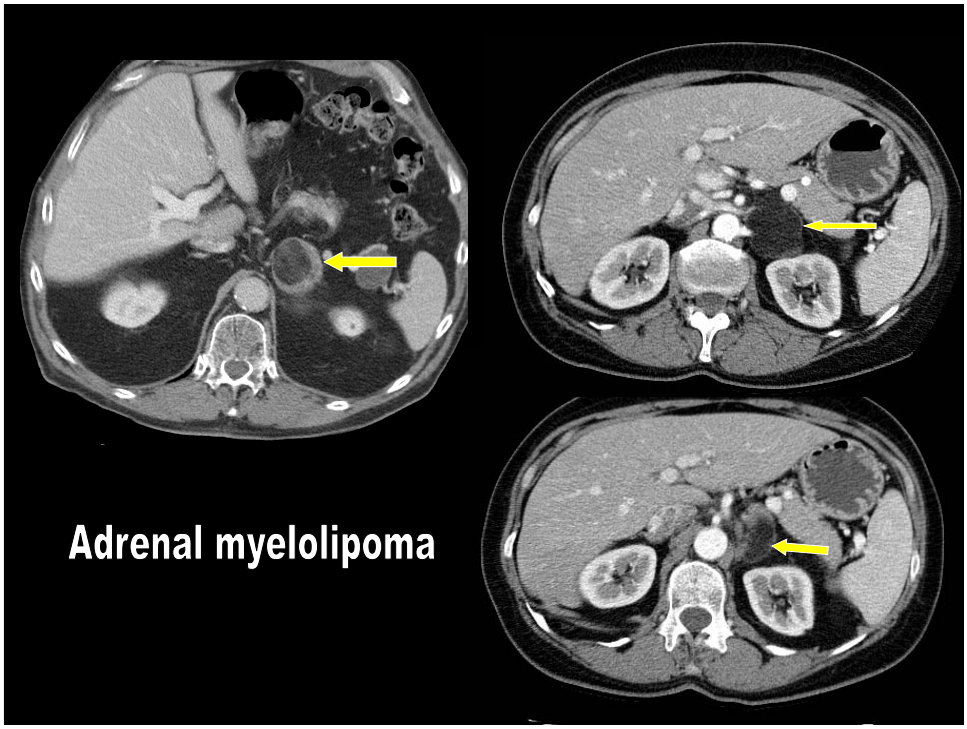
MR Imaging features

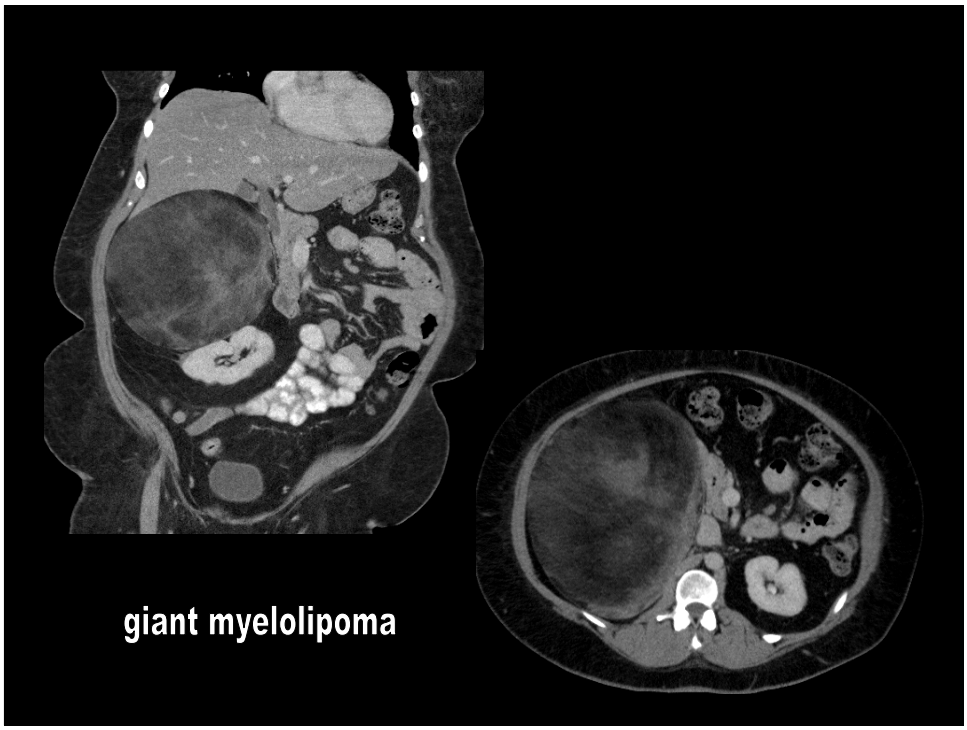
- Chemical shift imaging
  - Accuracy 96 to 100%



Axial T1 WI (a) in-phase and (b) out-of-phase images show an isointense mass in the left adrenal gland with loss of signal on out-of-phase image suggesting a fat rich adrenal adenoma.

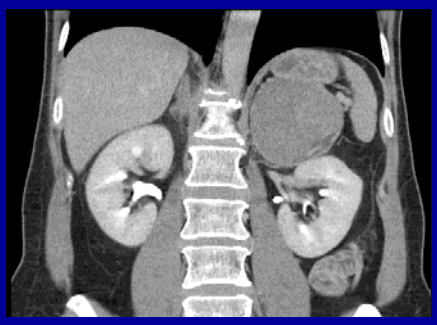
Chang A, Glazer HC, Lee JKT, Heiken JP (1987) Adrenal gland MR imaging. Radiology 163: 123–128
Mitchell DG, Crovello M, Matteucci T, Peterson RO, Miettinen MM (1992) Benign adrenocortical masses: diagnosis with chemical shift MR imaging. Radiology 195: 345–351

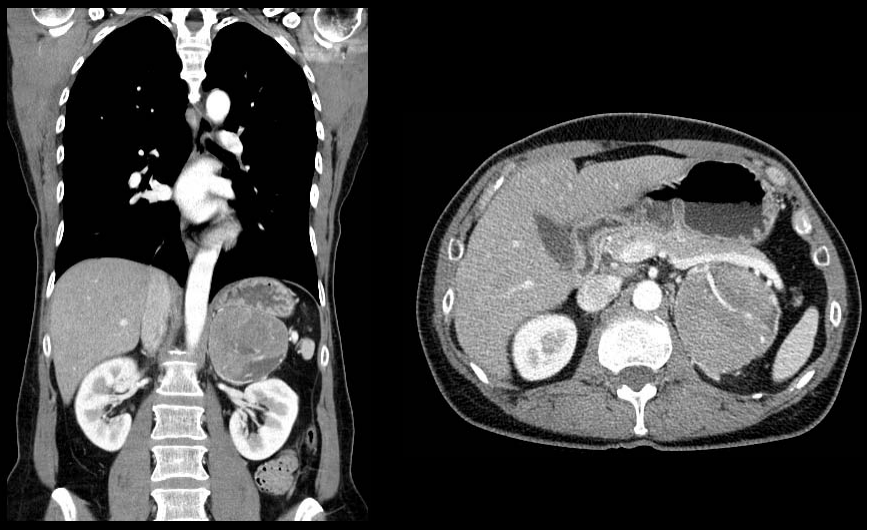

Adrenal myelolipoma


giant myelolipoma

ADRENAL

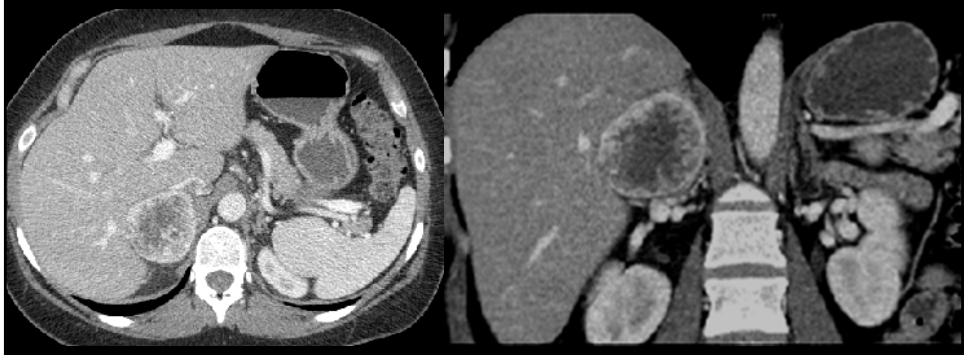
Malignant lesions





Adrenal cortical CA

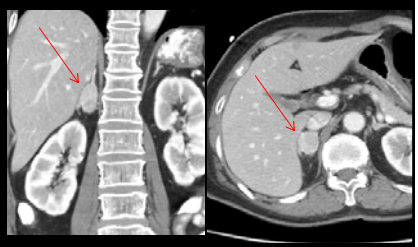
Case



History withheld

Pheochromocytoma

- Composed of chromaffin cells
- Malignant – 10 to 13%
- Extra-adrenal – 10%
  - Paragangliomas: base of brain to epididymis, usually sympathetic chain in retroperitoneum
- Diagnosis is by assay of catecholamines and their metabolites in blood or urine.
- Syndromes
  - MEN type 2
  - Von-Hippel Lindau disease
  - Neurofibromatosis
  - Carney's traid



Enhancing mass in the right adrenal gland (arrow). This was a pheochromocytoma.

Radin DR, Ralls PW, Boswell WD Jr, Colletti PM, Lapin SA, Halls JM (1986) Phaeochromocytoma detection by unenhanced CT. PJR 146: 741–744
van Heerden JA, Sheps SG, Hamberger B, Sheedy PF, Poston JG, ReMine WH (1982) Pheochromocytoma: current status and changing trends. Surgery 91: 367–373

Pheochromocytoma

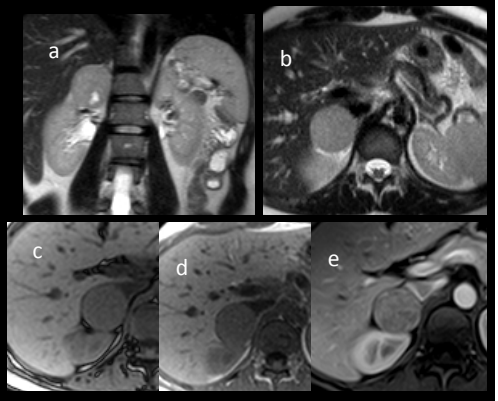
- Rounded or oval masses of similar density to liver on non-contrast-enhanced scans.
- Central necrosis is frequent
- enhance markedly after injection of intravenous contrast medium

Axial (a) non-contrast and (b) post-contrast images showing an enhancing mass in the right adrenal gland. Central cystic areas may be due to necrosis. Coronal (c) reformat shows the suprarenal location of the mass.

Velchik MS, Alavi A, Kressel HY, Engelman K (1989) Localization of phaeochromocytomas: mIBG, CTand MRI correlation. J Nucl Med 30: 328–336
Quint LE, Glazer GM, Francis IR, Shapiro B, Chenevert TC (1987) Phaeochromocytoma and paraganglioma: comparison of MR imaging with CT and 131I mIBG scintigraphy. Radiology 165: 89–93

Pheochromocytoma

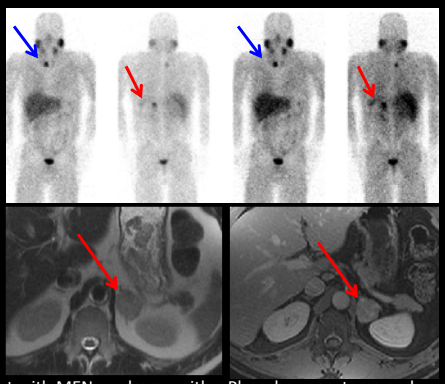
- MRI –
  - Hypointense on T1-weighted images and markedly hyperintense on T2-weighted images
  - 35% - atypical signal intensity on T2-weighted images
  - Enhance markedly following injection



Right adrenal Pheochromocytoma: T2 coronal (a) and axial (b) image showing a isointense mass superior to the kidney with small cystic areas in it. Out of phase (c), Precontrast (d), and post contrast T1(e) images show a mildly enhancing mass.

Pheochromocytoma

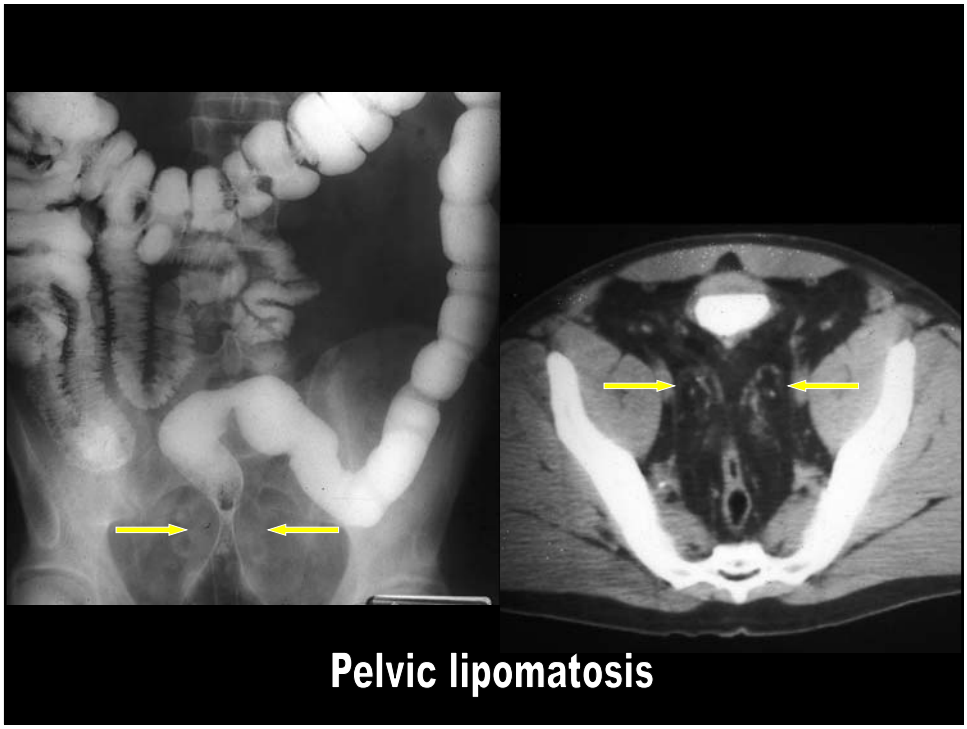
- NM –
  - Iodine 131 metaiodobenzylguanidine (MIBG) or indium-labelled penetreotide (Octreoscan), particularly helpful for extra-adrenal lesions



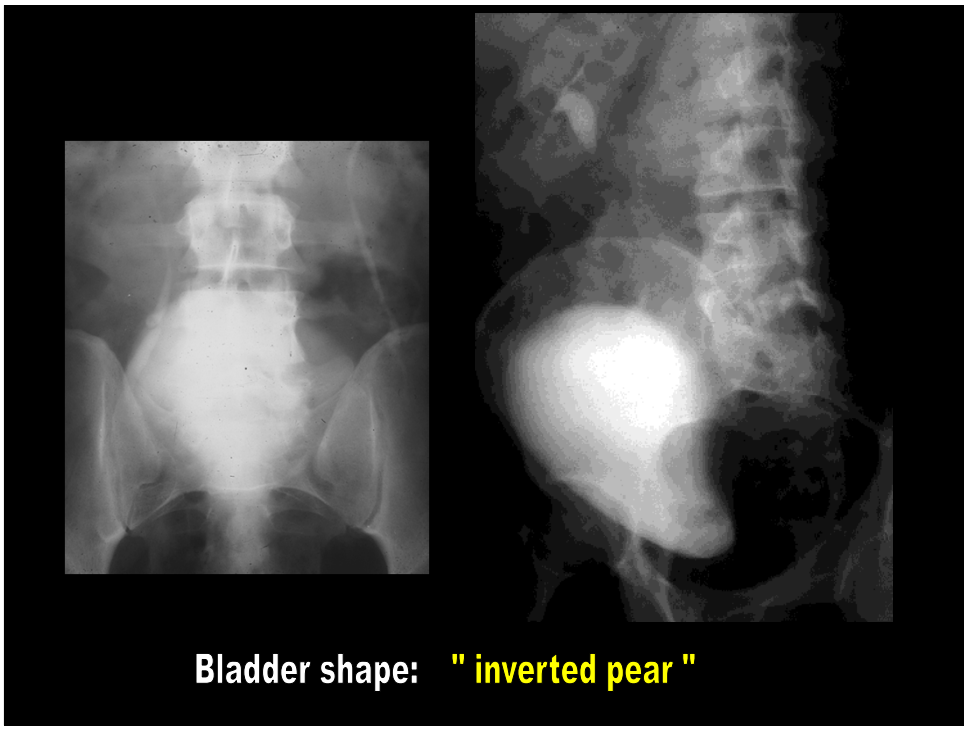
Patient with MEN syndrome with a Pheochormocytoma and medullary thyroid CA. Focus of increased uptake in the left adrenal gland consistent with a pheochromocytoma and another focus of increased uptake in the right inferior thyroid which was shown to be consistent with a solid lesion on US. This was a medullary thyroid carcinoma. MRI confirmed the pheochromocytoma in the left adrenal gland (red arrow)

RETR0PERITONEUM

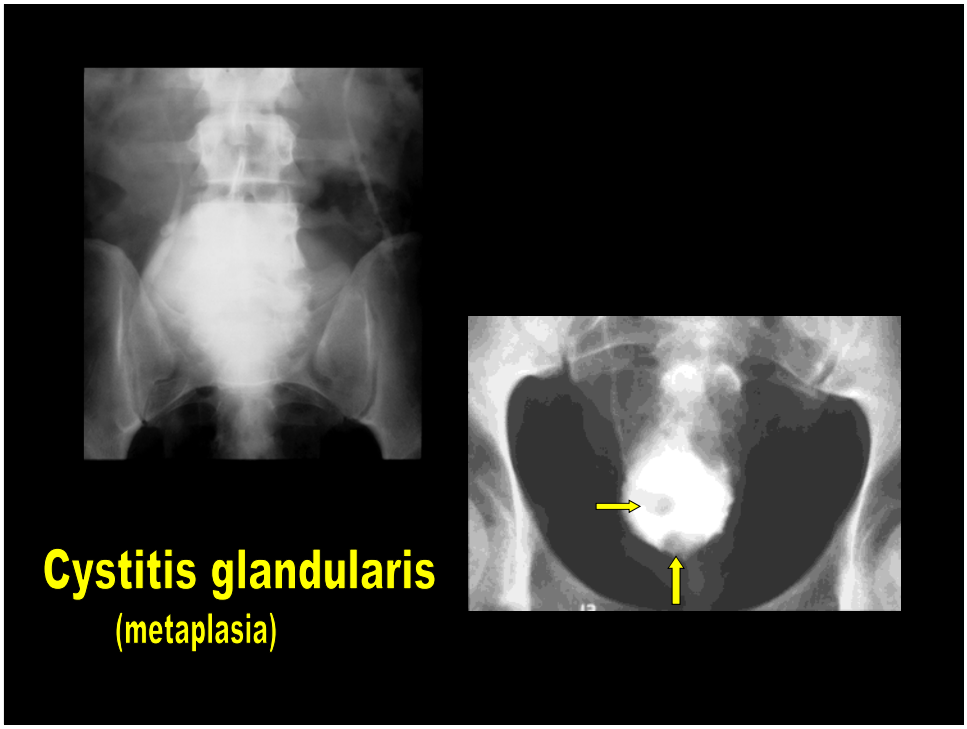
PELVIC LIPOMATOSIS

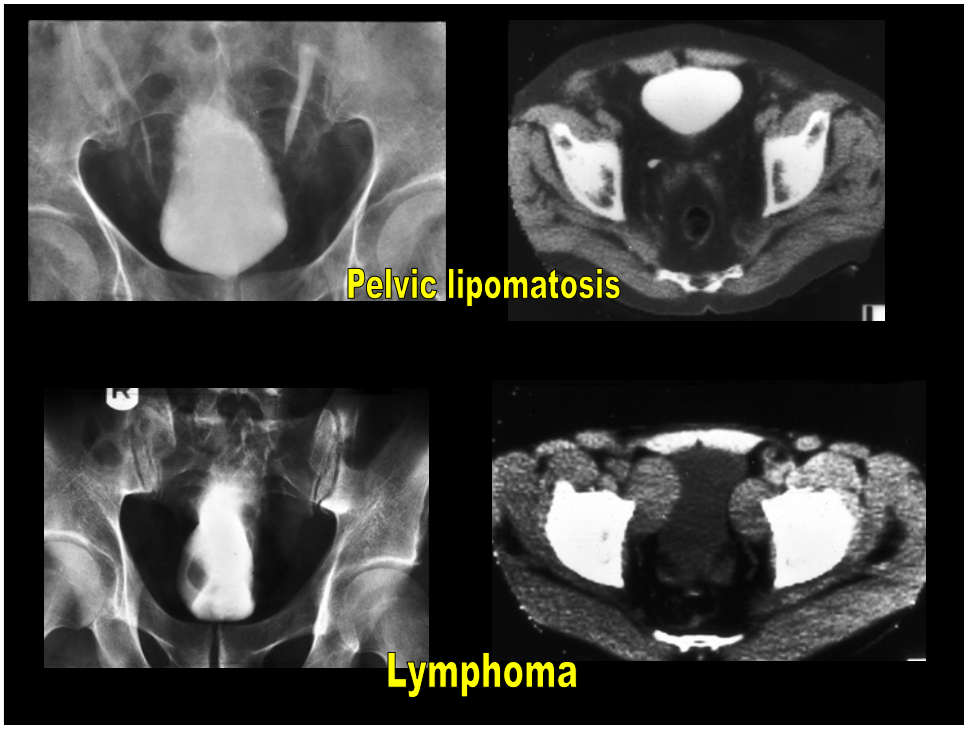


Pelvic lipomatosis

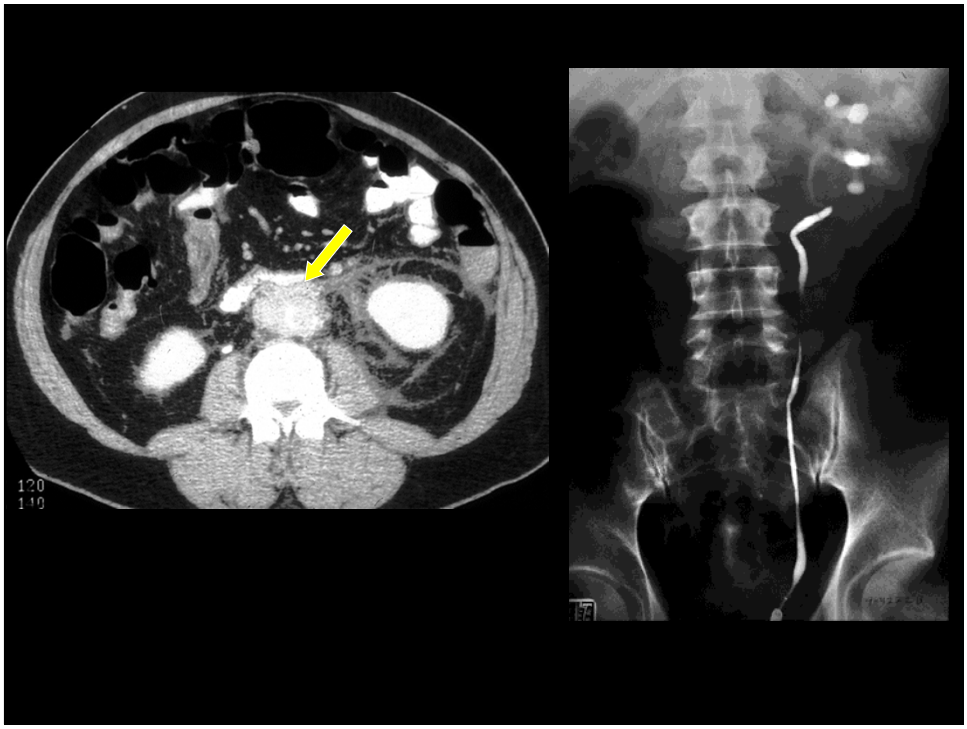


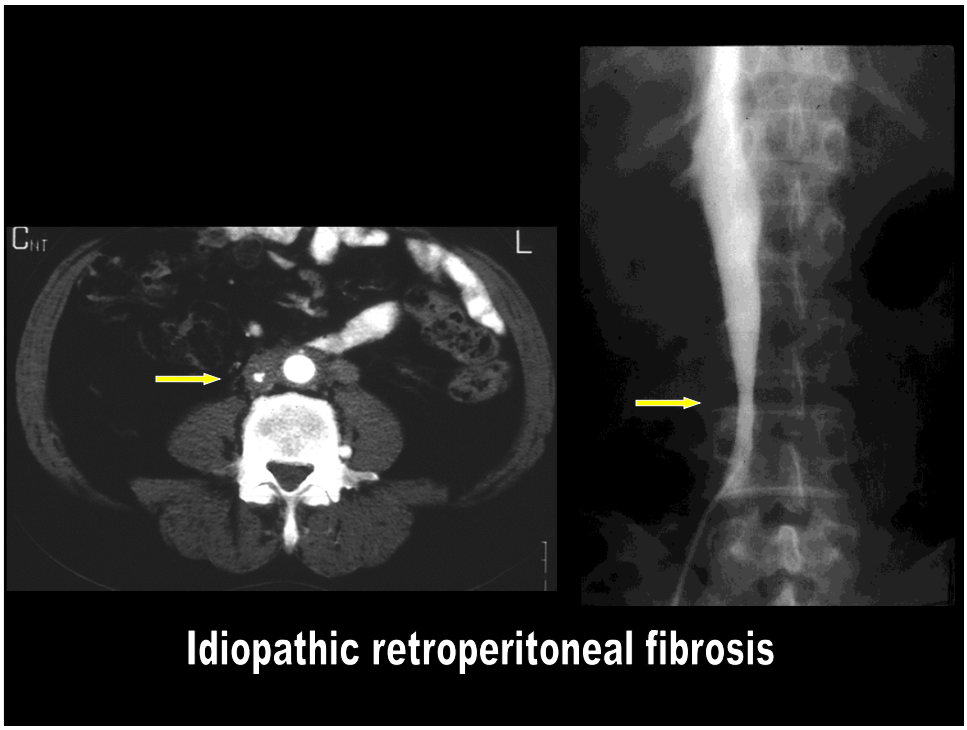
Bladder shape: " inverted pear "


Cystitis glandularis
(metaplasia)

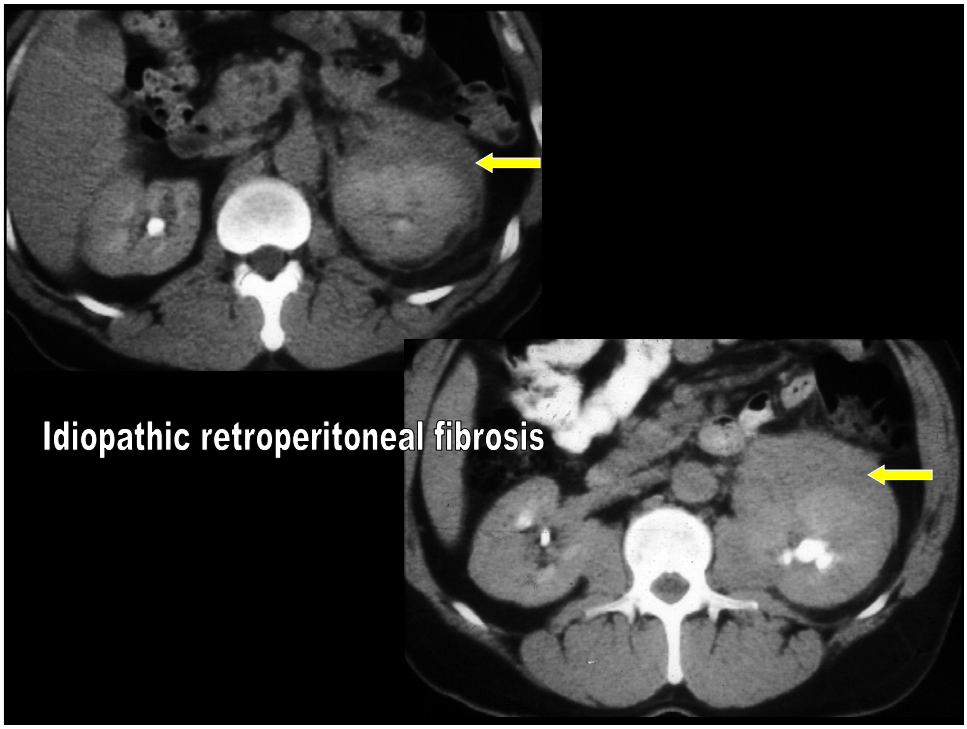

Pelvic lipomatosis
Lymphoma

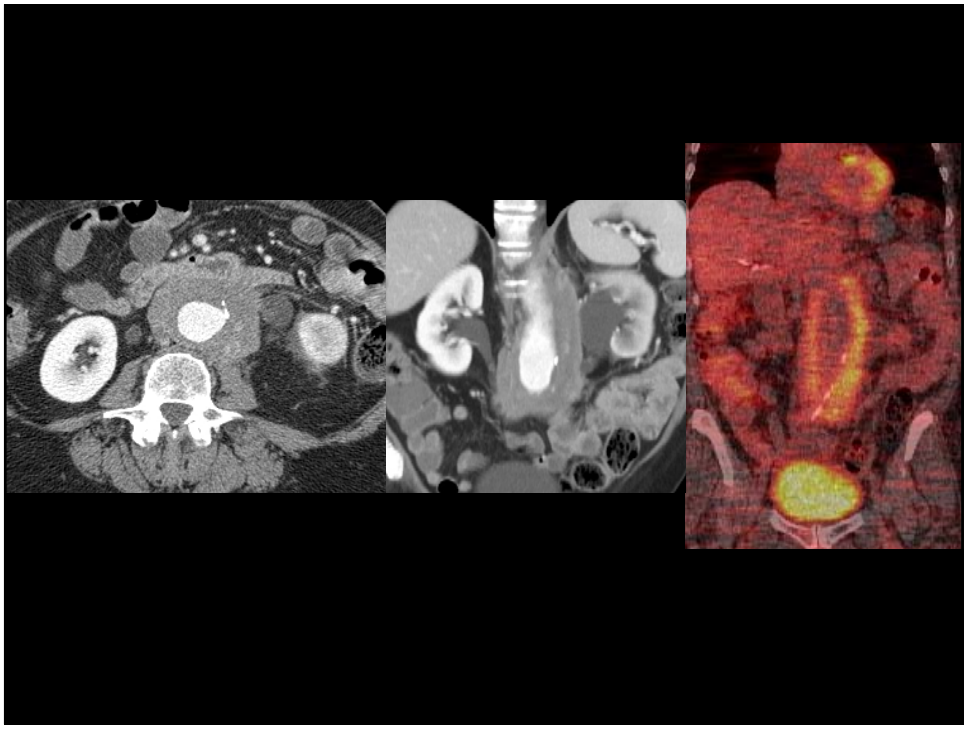
RETROPERITONEAL FIBROSIS

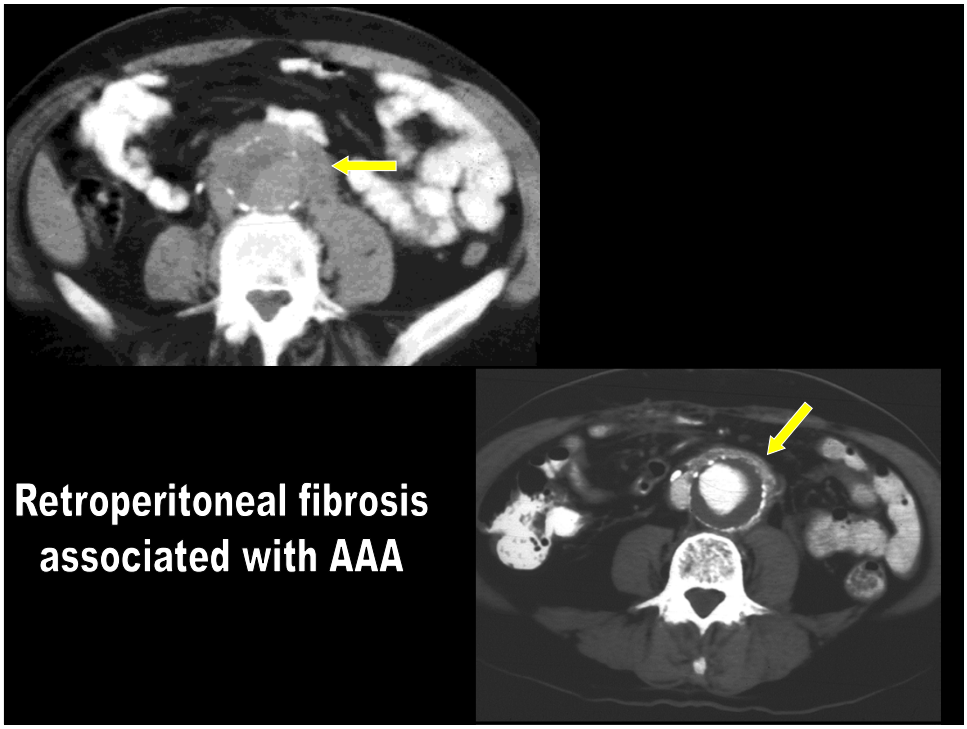


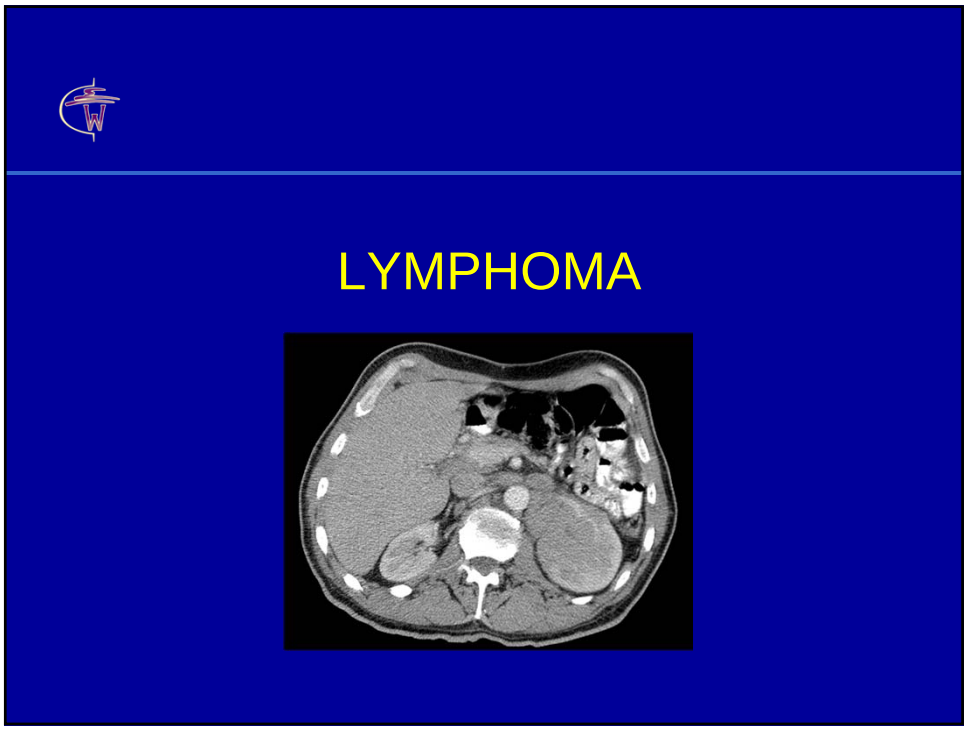


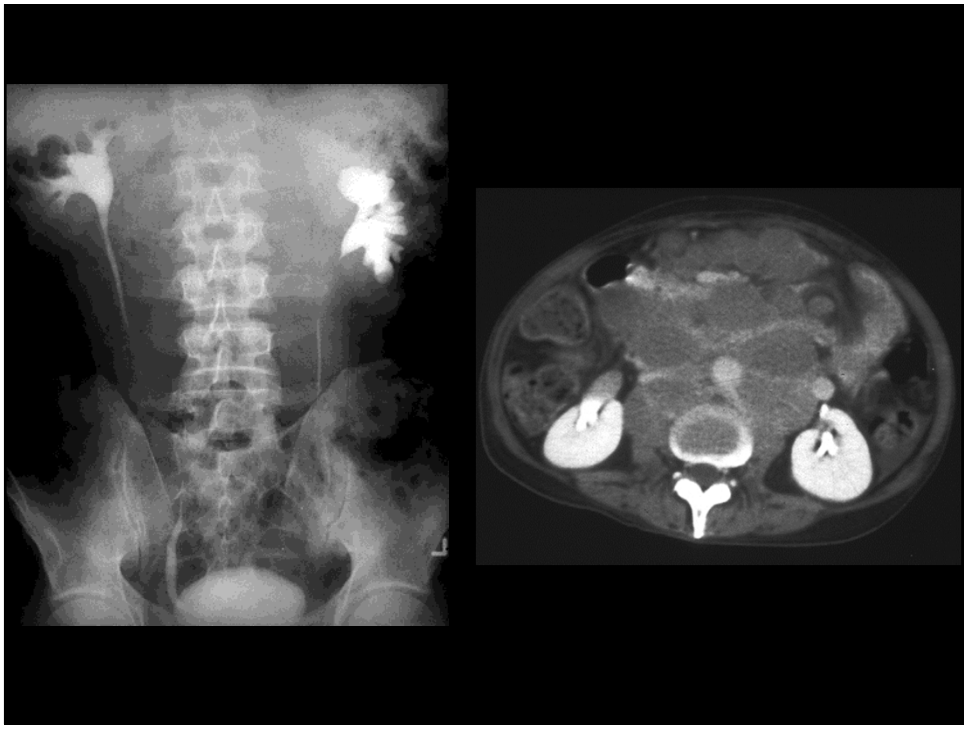
Idiopathic retroperitoneal fibrosis

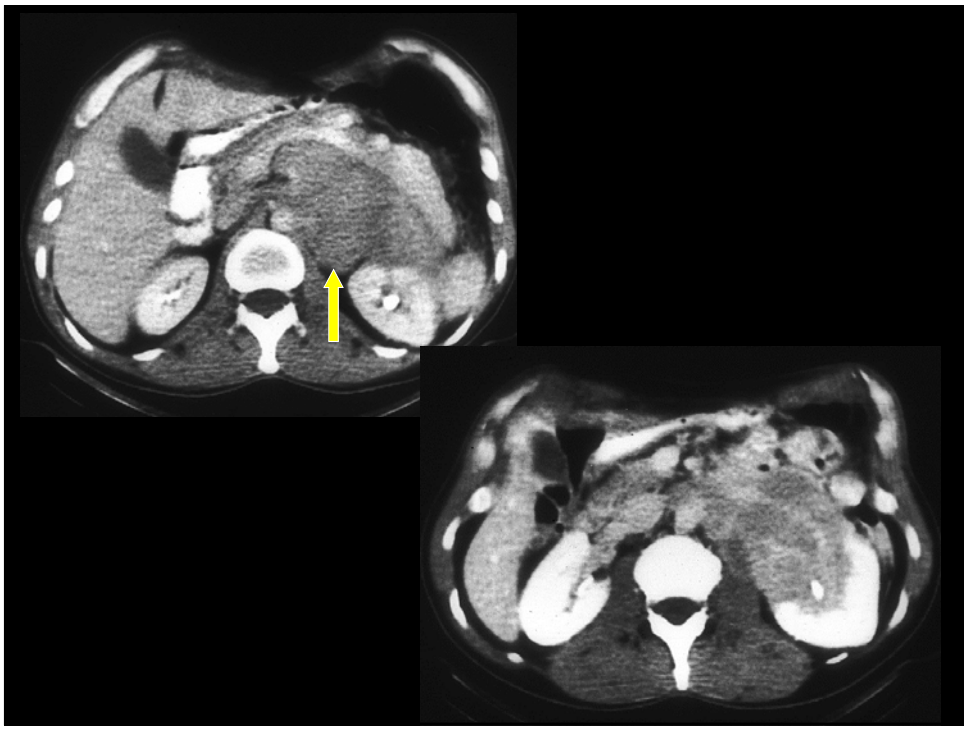

Idiopathic retroperitoneal fibrosis

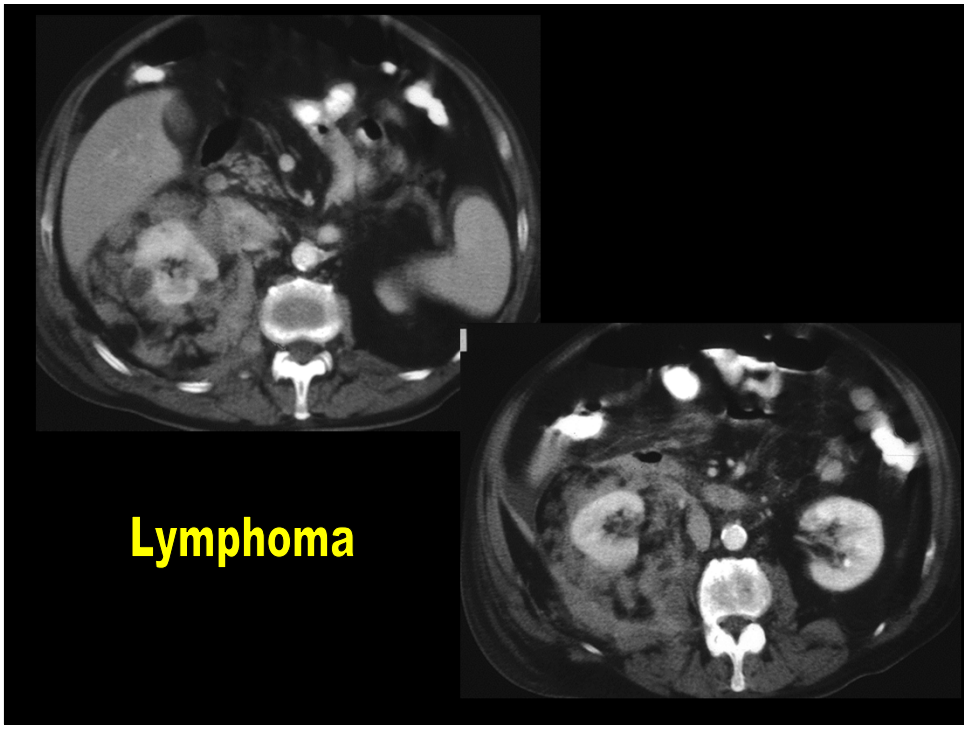



Retroperitoneal fibrosis
associated with AAA

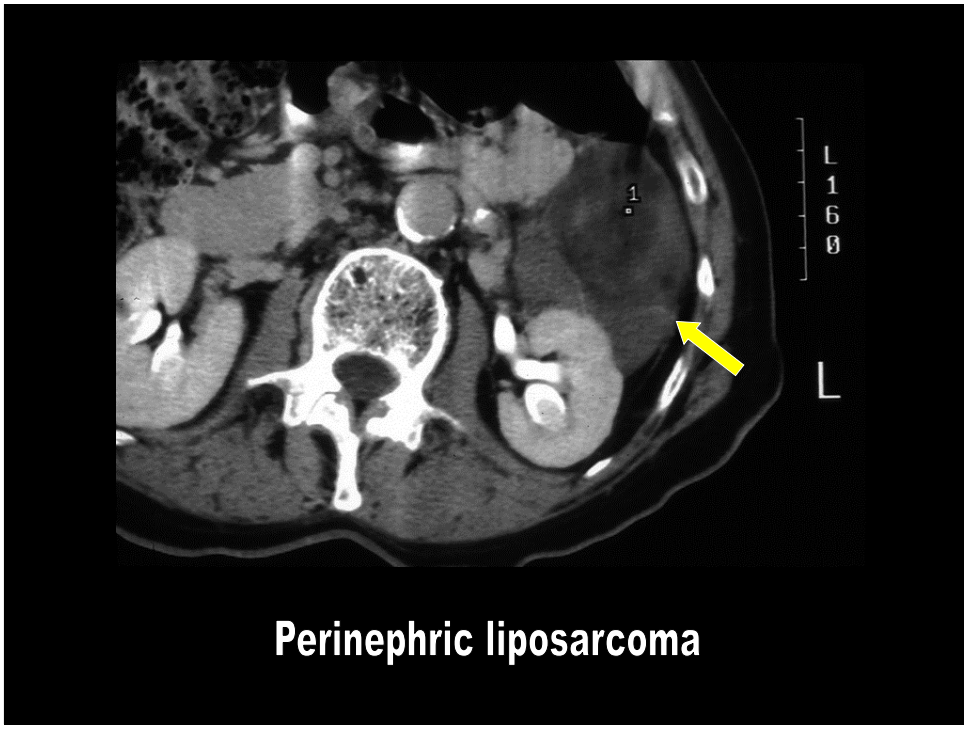

LYMPHOMA







RETROPERITONEAL
LIPOSARCOMA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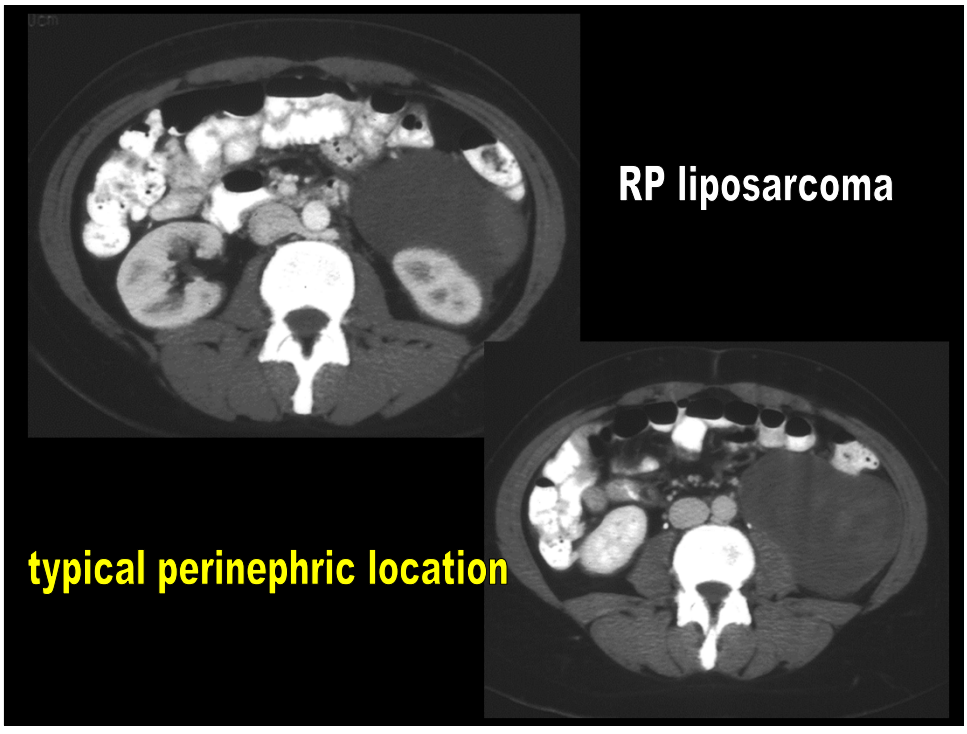
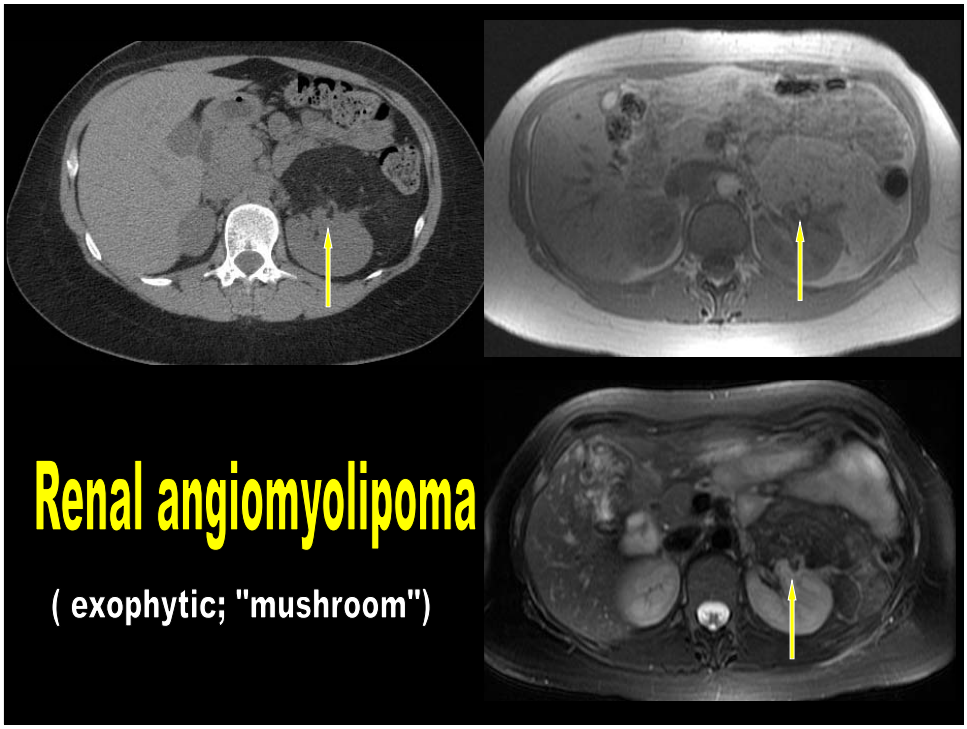
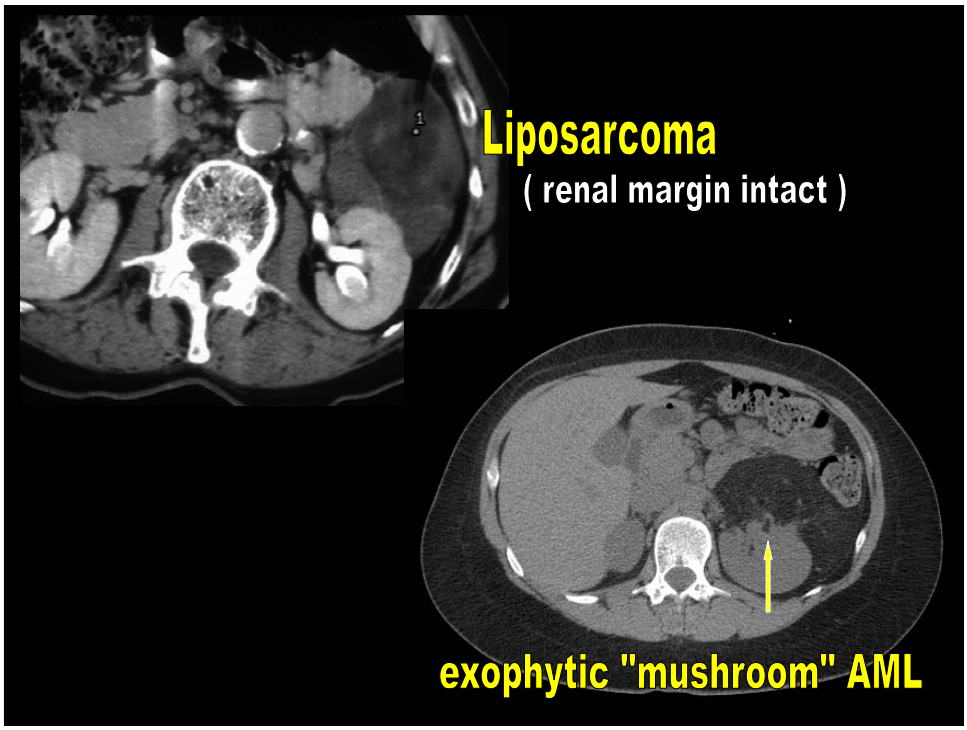
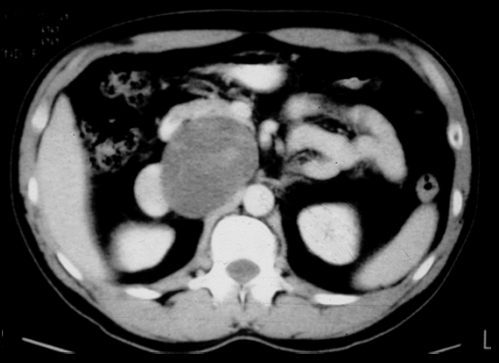
L
Perinephric liposarcoma


RP liposarcoma
typical perinephric location


Renal angiomyolipoma
(exophytic; "mushroom")

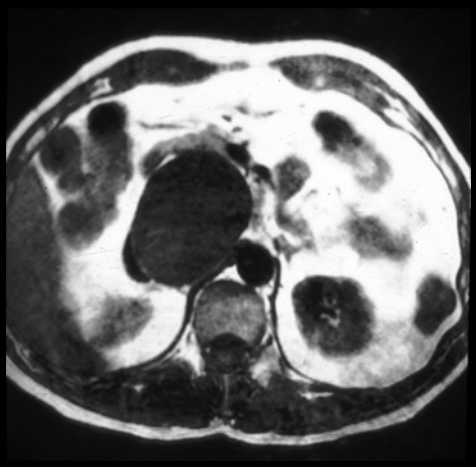

Liposarcoma
(renal margin intact)
exophytic "mushroom" AML

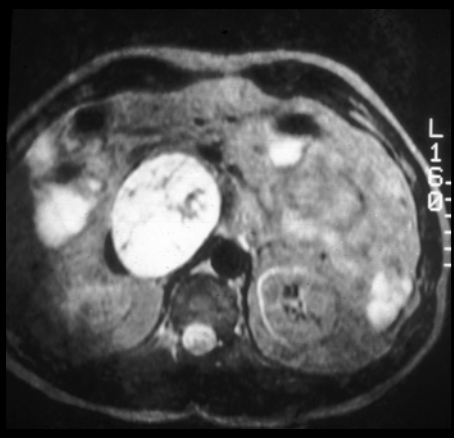
Unknown case



Diagnosis?

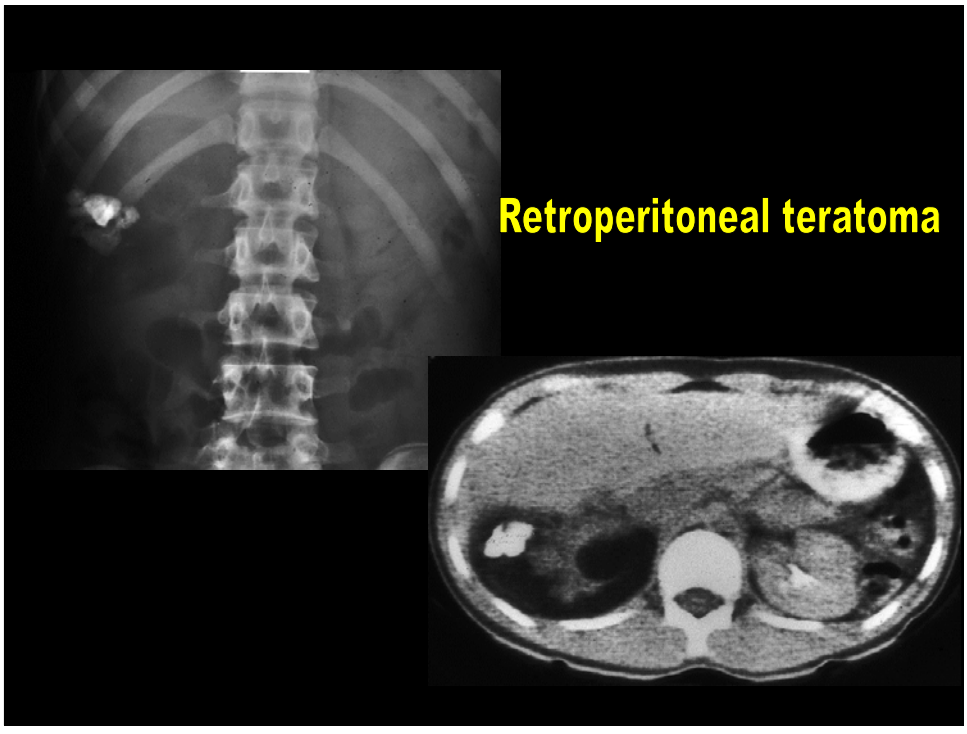
A. Lymphoma
B. Leiomyosarcoma
C. Retroperitoneal liposarcoma

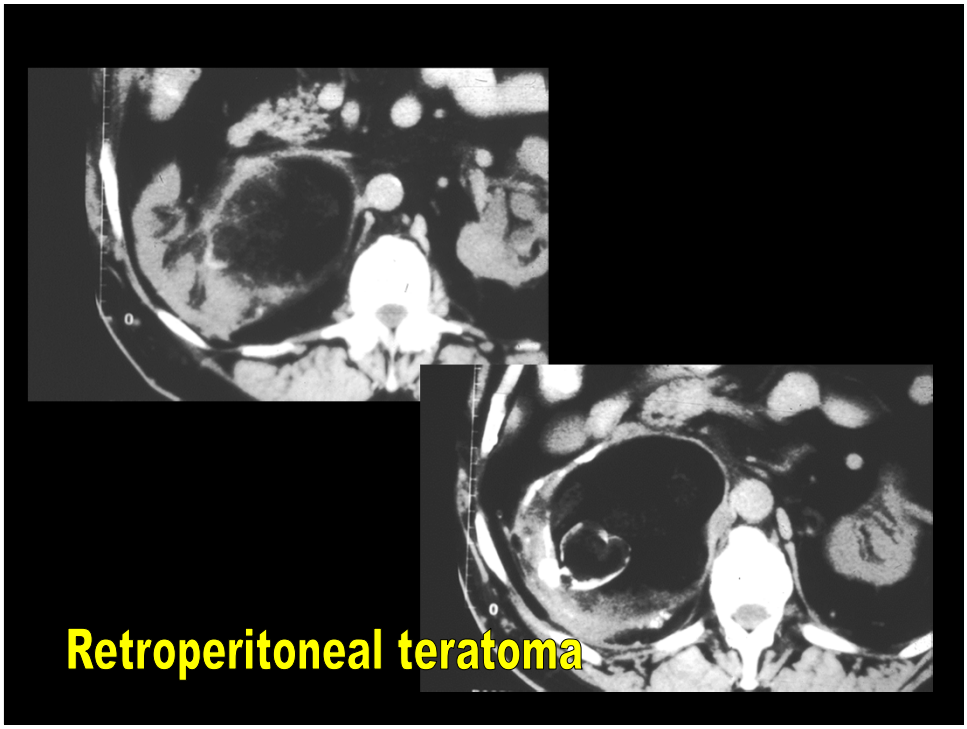


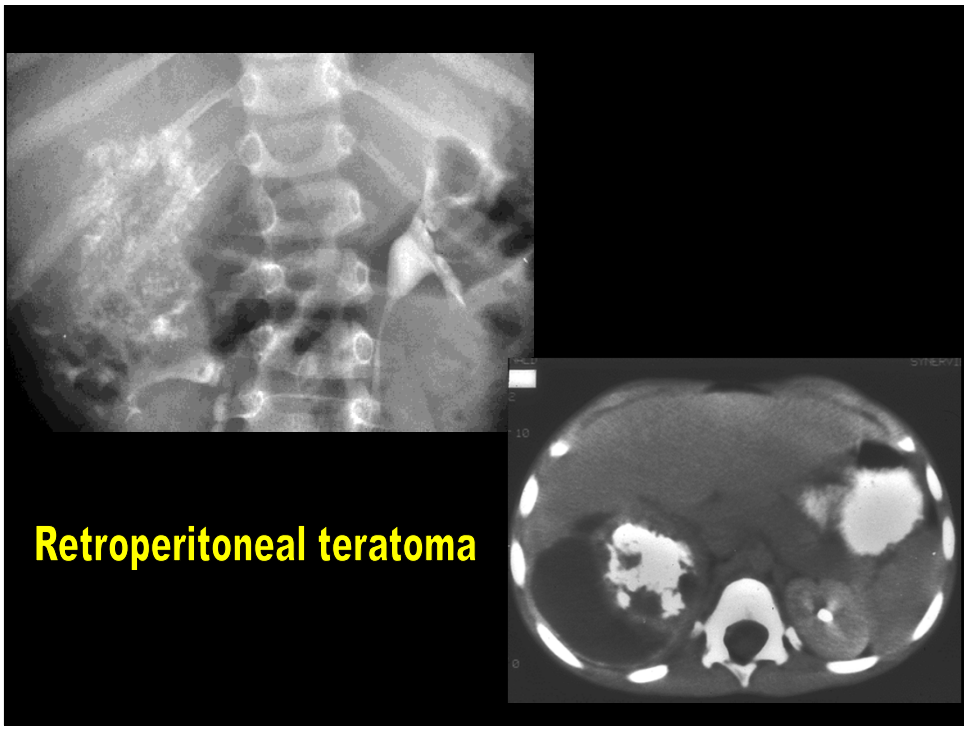


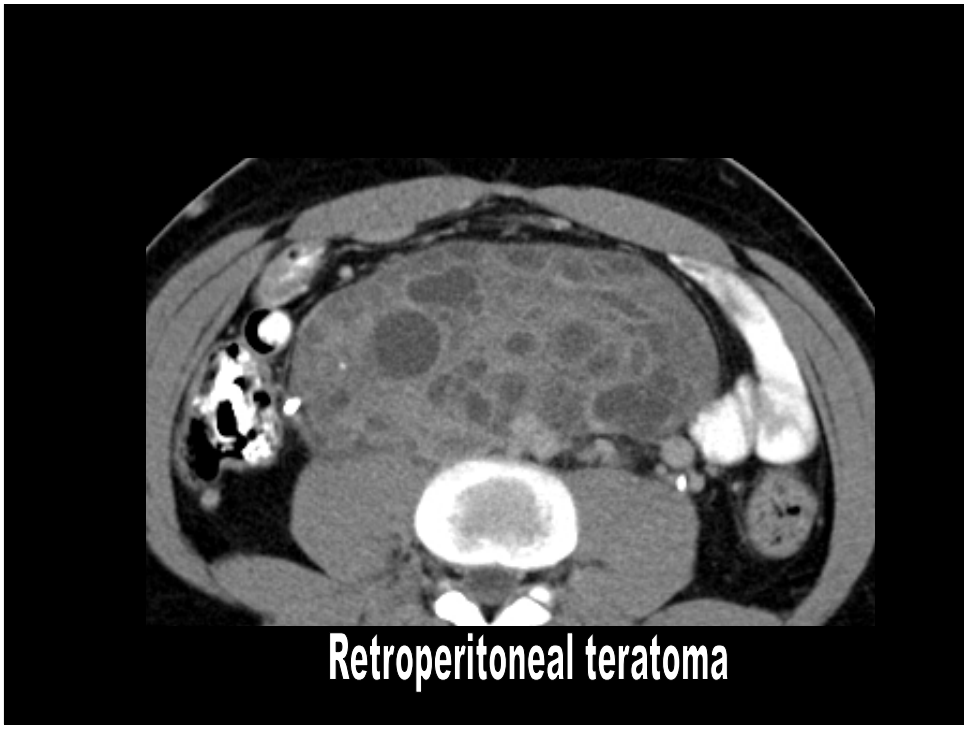
Leiomyosarcoma of IVC

RETROPERITONEAL TERATOMA




Retroperitoneal teratoma


Retroperitoneal teratoma



Retroperitoneal teratoma

PELVIC TERATOMA

90 % newborns & infants;
80 % benign

Sacral Teratoma