Tumors of the kidney

Tumors of the kidney

Types

Benign

Malignant

Childhood tumors

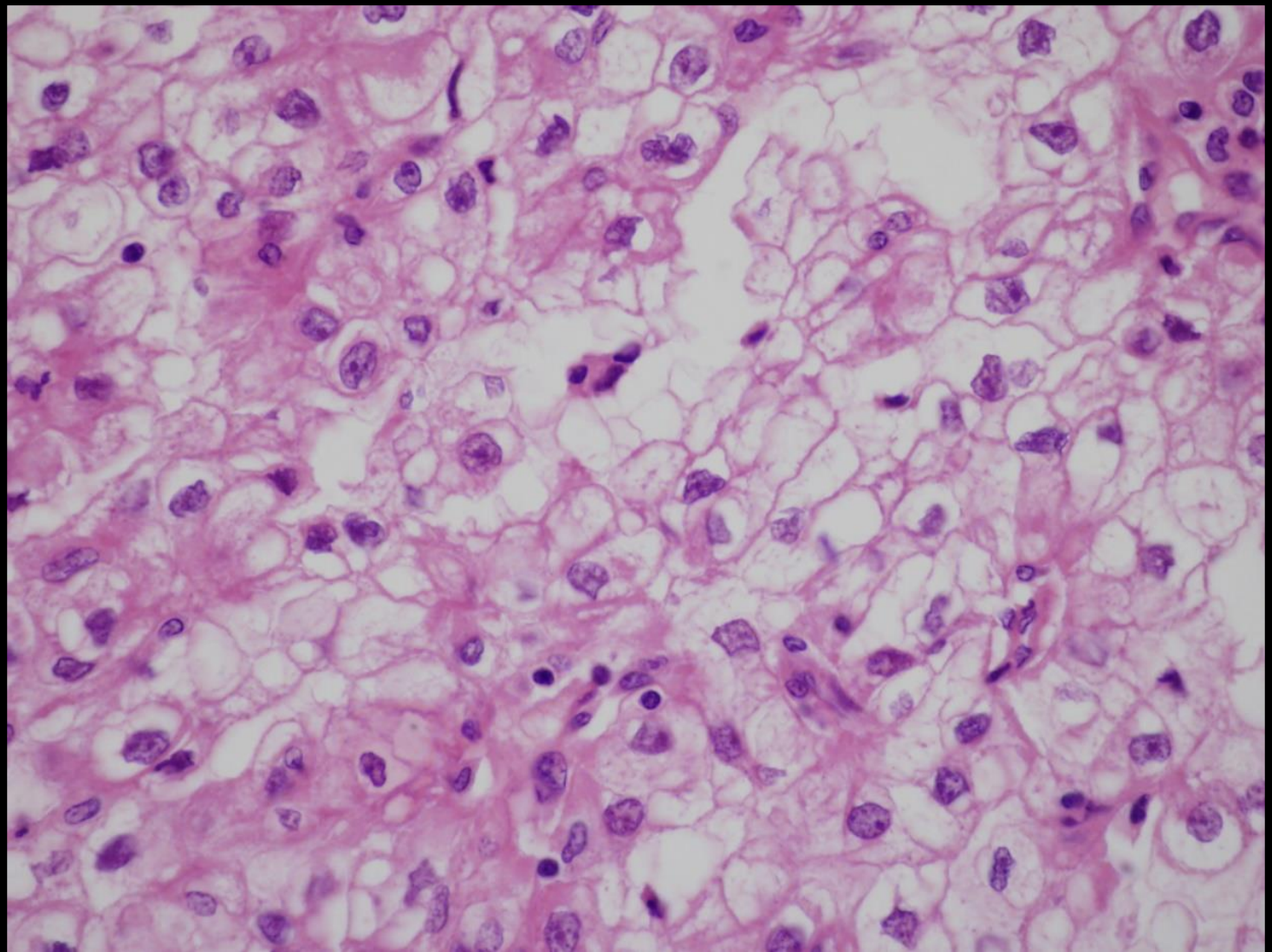
WHO classification of tumours of the kidney

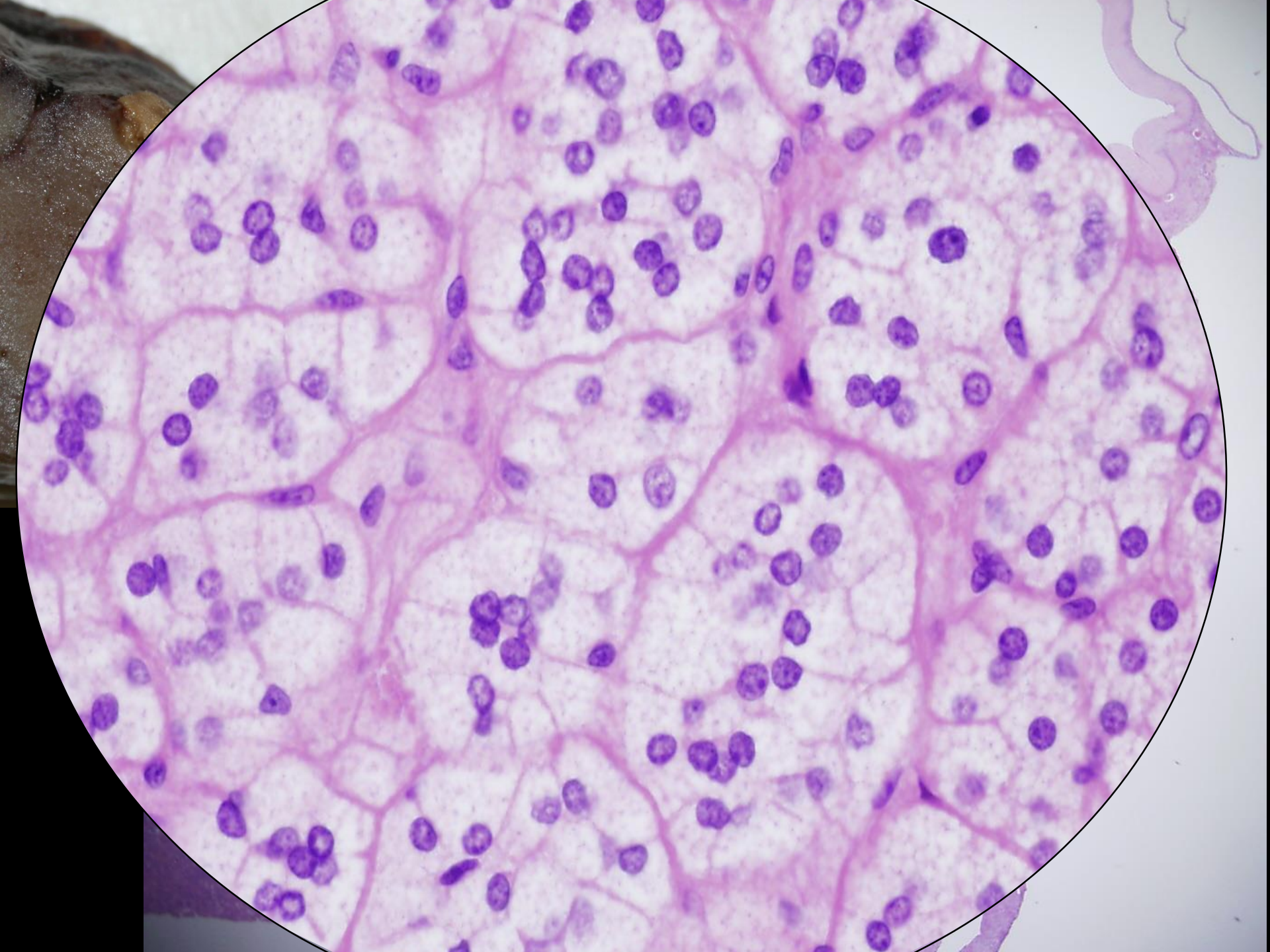
Renal cell tumours	
Clear cell renal cell carcinoma	8310/3
Multilocular cystic renal neoplasm of low malignant potential	8316/1*
Papillary renal cell carcinoma	8260/3
Hereditary leiomyomatosis and renal cell carcinoma–associated renal cell carcinoma	8311/3*
Chromophobe renal cell carcinoma	8317/3
Collecting duct carcinoma	8319/3
Renal medullary carcinoma	8510/3*
MiT family translocation renal cell carcinomas	8311/3*
Succinate dehydrogenase–deficient renal carcinoma	8311/3
Mucinous tubular and spindle cell carcinoma	8480/3*
Tubulocystic renal cell carcinoma	8316/3*
Acquired cystic disease–associated renal cell carcinoma	8316/3
Clear cell papillary renal cell carcinoma	8323/1
Renal cell carcinoma, unclassified	8312/3
Papillary adenoma	8260/0
Oncocytoma	8290/0
Metanephric tumours	
Metanephric adenoma	8325/0
Metanephric adenofibroma	9013/0
Metanephric stromal tumour	8935/1
Nephroblastic and cystic tumours occurring mainly in children	
Nephrogenic rests	
Nephroblastoma	8960/3
Cystic partially differentiated nephroblastoma	8959/1
Paediatric cystic nephroma	8959/0
Mesenchymal tumours	
Mesenchymal tumours occurring mainly in children	
Clear cell sarcoma	8964/3
Rhabdoid tumour	8963/3
Congenital mesoblastic nephroma	8960/1
Ossifying renal tumour of infancy	8967/0
Mesenchymal tumours occurring mainly in adults	
Leiomyosarcoma	8890/3
Angiosarcoma	9120/3
Rhabdomyosarcoma	8900/3
Osteosarcoma	9180/3
Synovial sarcoma	9040/3
Ewing sarcoma	9364/3
Angiomyolipoma	8860/0
Epithelioid angiomyolipoma	8860/1*
Leiomyoma	8890/0
Haemangioma	9120/0
Lymphangioma	9170/0
Haemangioblastoma	9161/1
Juxtaglomerular cell tumour	8361/0
Renomedullary interstitial cell tumour	8966/0
Schwannoma	9560/0
Solitary fibrous tumour	8815/1
Mixed epithelial and stromal tumour family	
Cystic nephroma	8959/0
Mixed epithelial and stromal tumour	8959/0
Neuroendocrine tumours	
Well-differentiated neuroendocrine tumour	8240/3
Large cell neuroendocrine carcinoma	8013/3
Small cell neuroendocrine carcinoma	8041/3
Phaeochromocytoma	8700/0
Miscellaneous tumours	
Renal haematopoietic neoplasms	
Germ cell tumours	
Metastatic tumours	

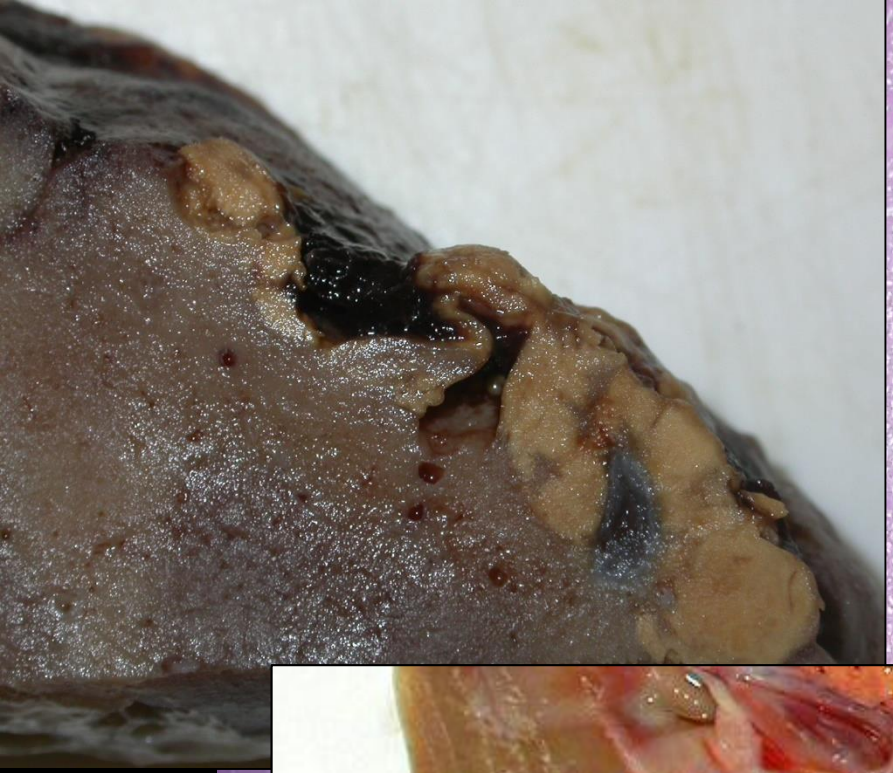
The morphology codes are from the International Classification of Diseases for Oncology (ICD-O) {917A}. Behaviour is coded /0 for benign tumours; /1 for unspecified, borderline, or uncertain behaviour; /2 for carcinoma in situ and grade III intraepithelial neoplasia; and /3 for malignant tumours. The classification is modified from the previous WHO classification {756A}, taking into account changes in our understanding of these lesions.

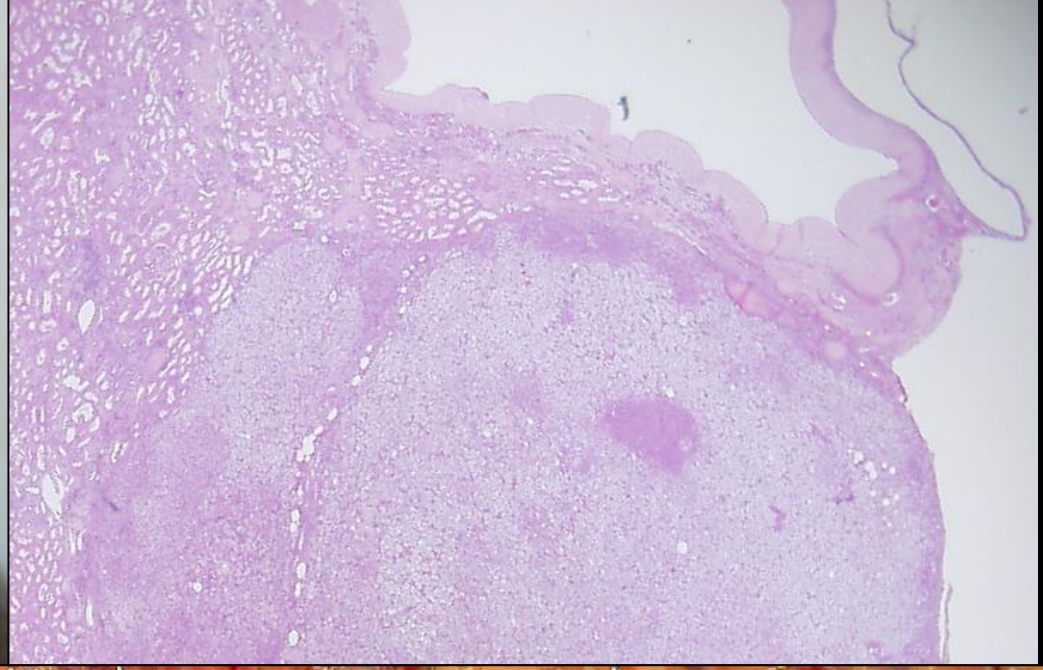
*New code approved by the IARC/WHO Committee for ICD-O.

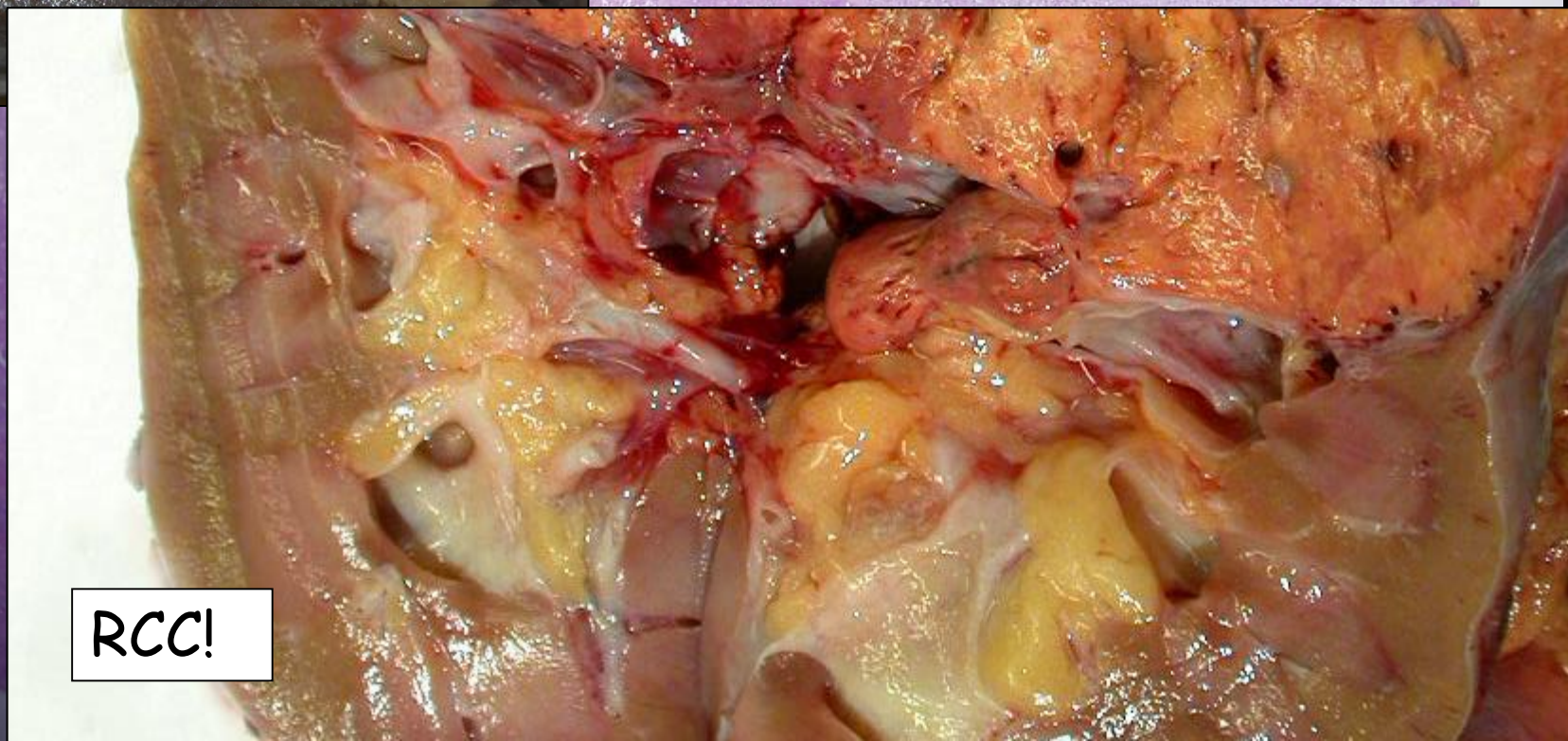
Clear cell renal carcinoma in the focus



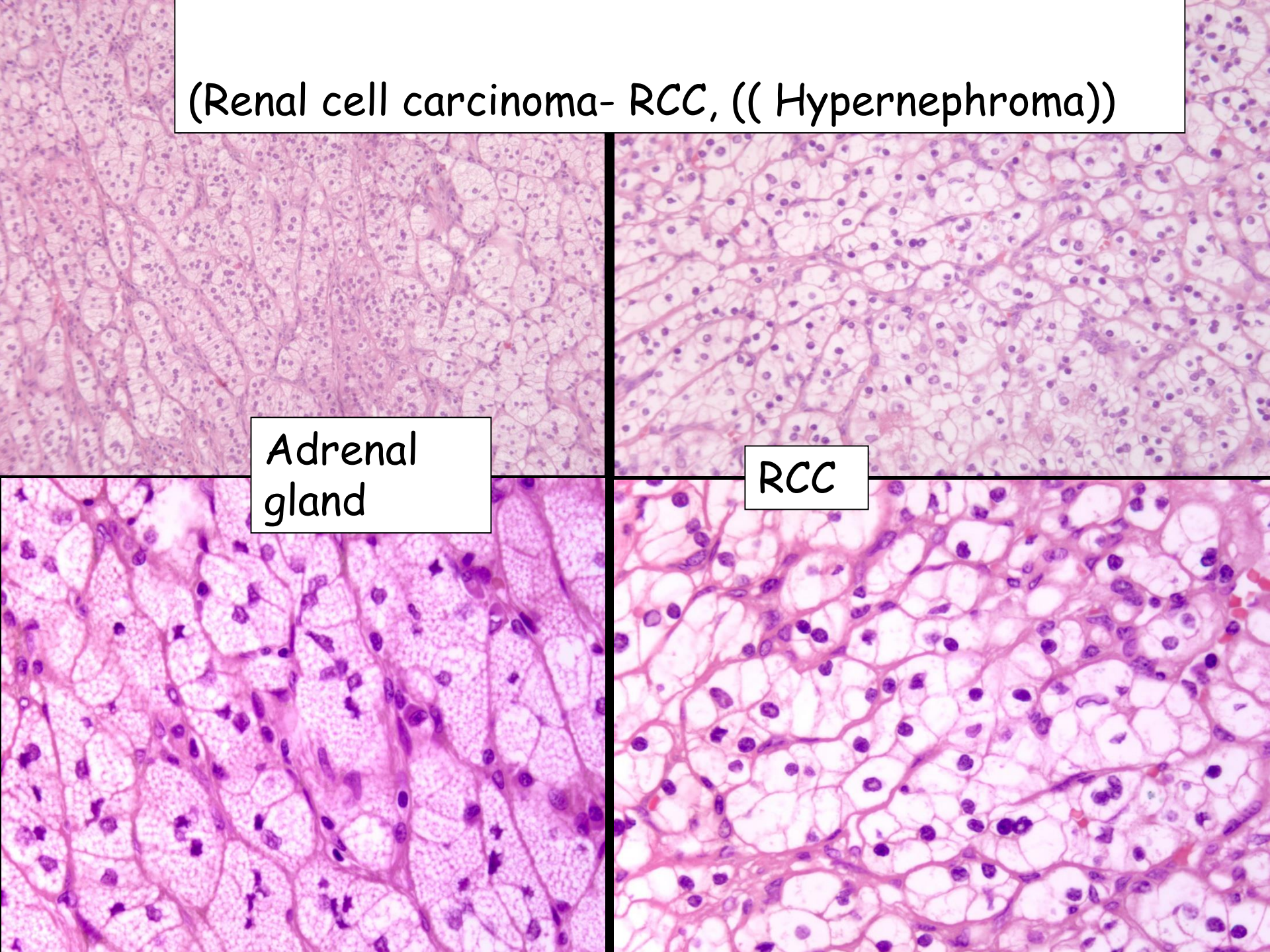







RCC!

(Renal cell carcinoma- RCC, ((Hypernephroma))



RCC – „Classic" symptoms

Haematuria

Hypertension

Costovertebral pain (flank) pain

No symptoms

Most cases are incidental

Diagnostics

US

CT

MR

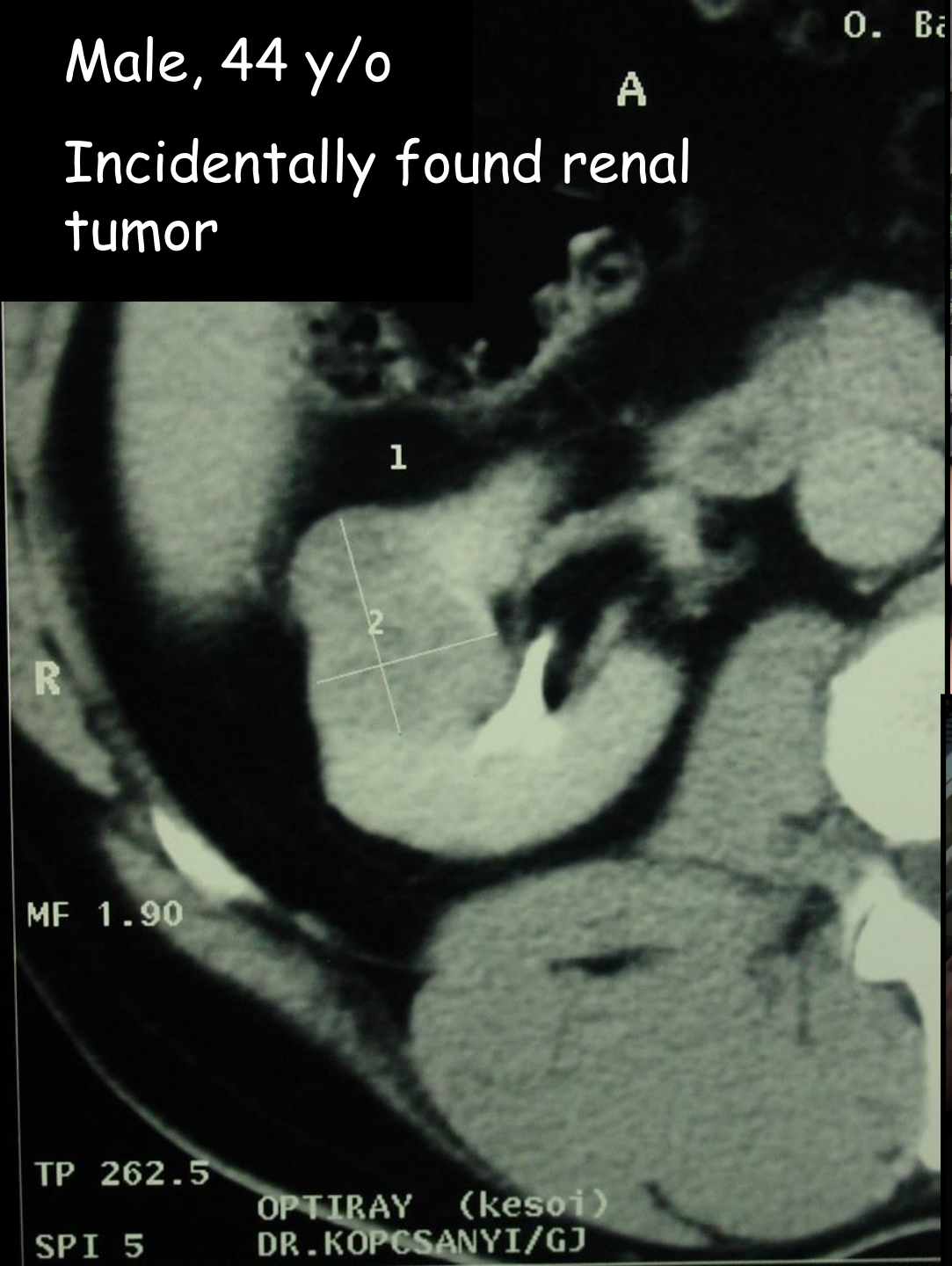
Preoperative :

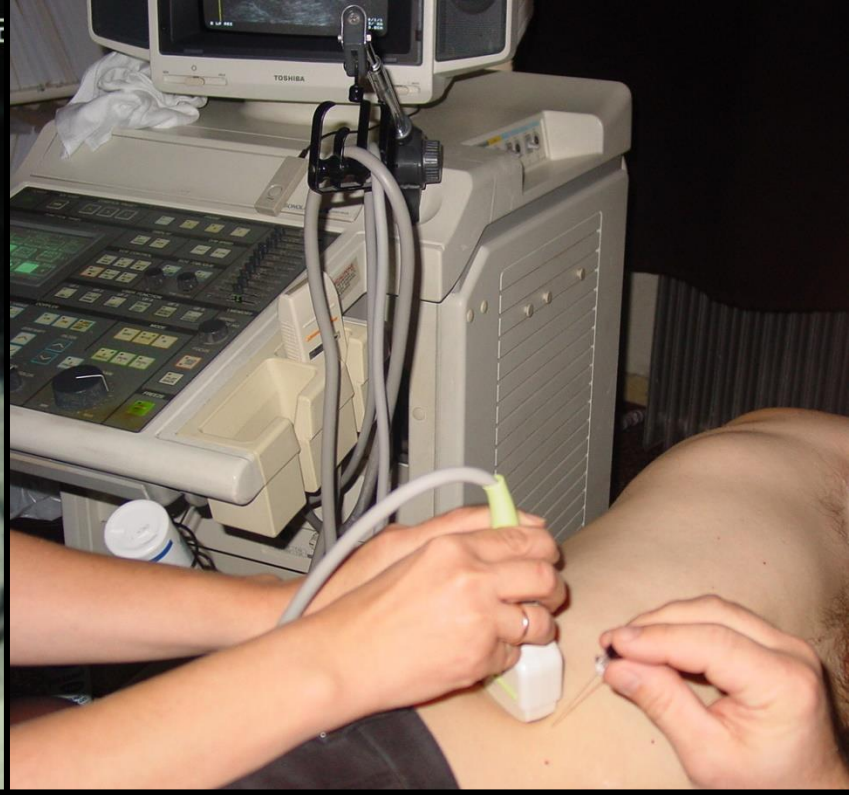
FNAB

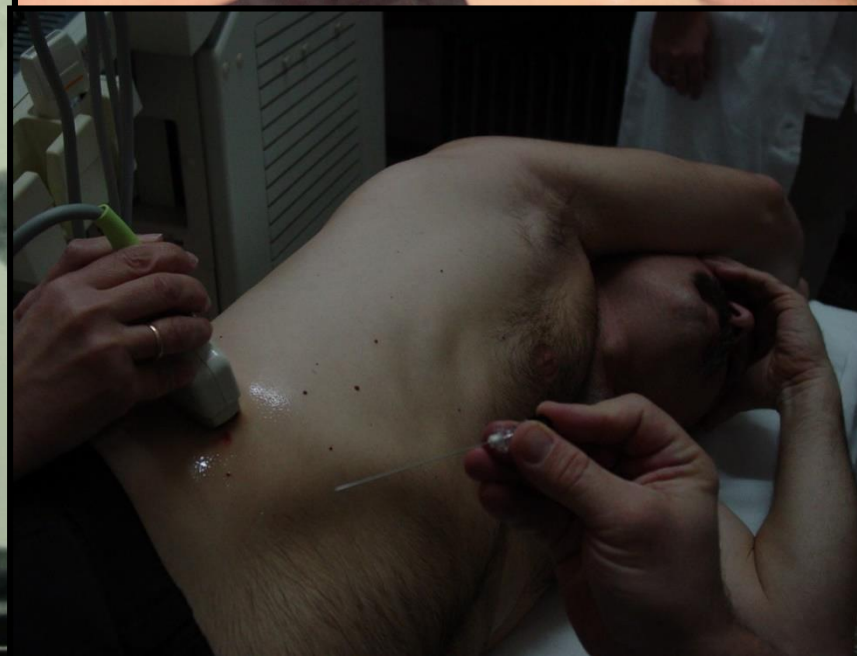
Core-biopsy

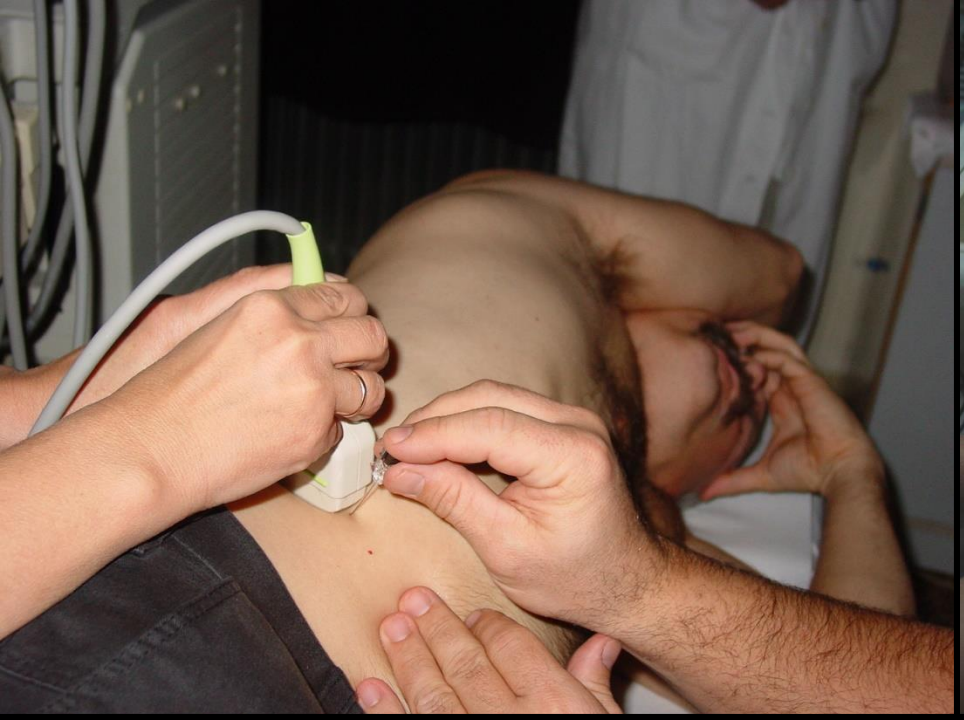
Male, 44 y/o

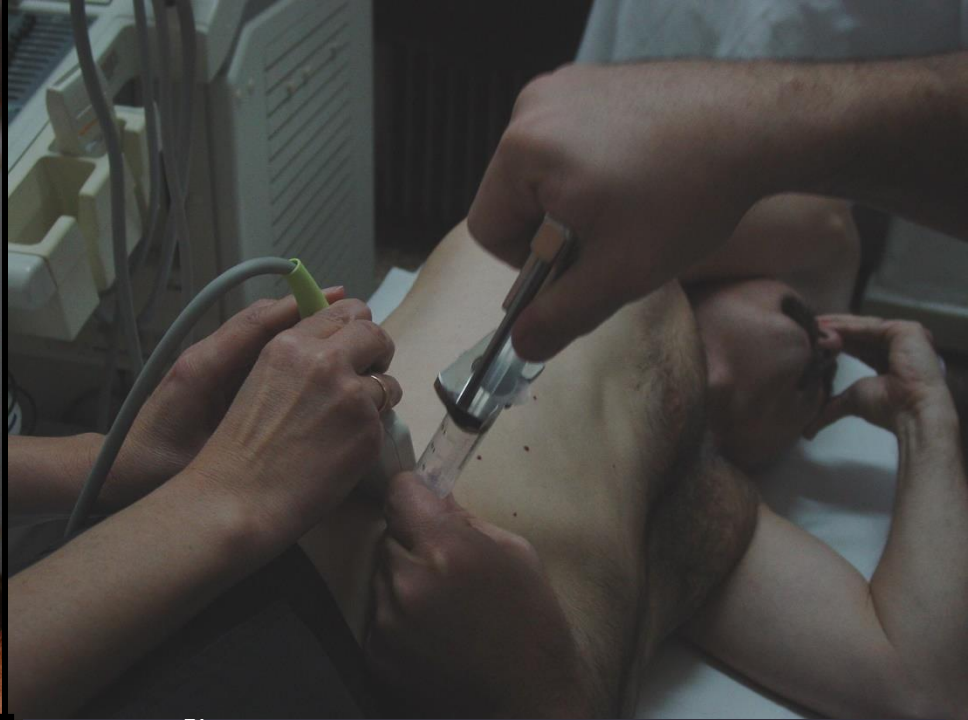
Incidentally found renal tumor

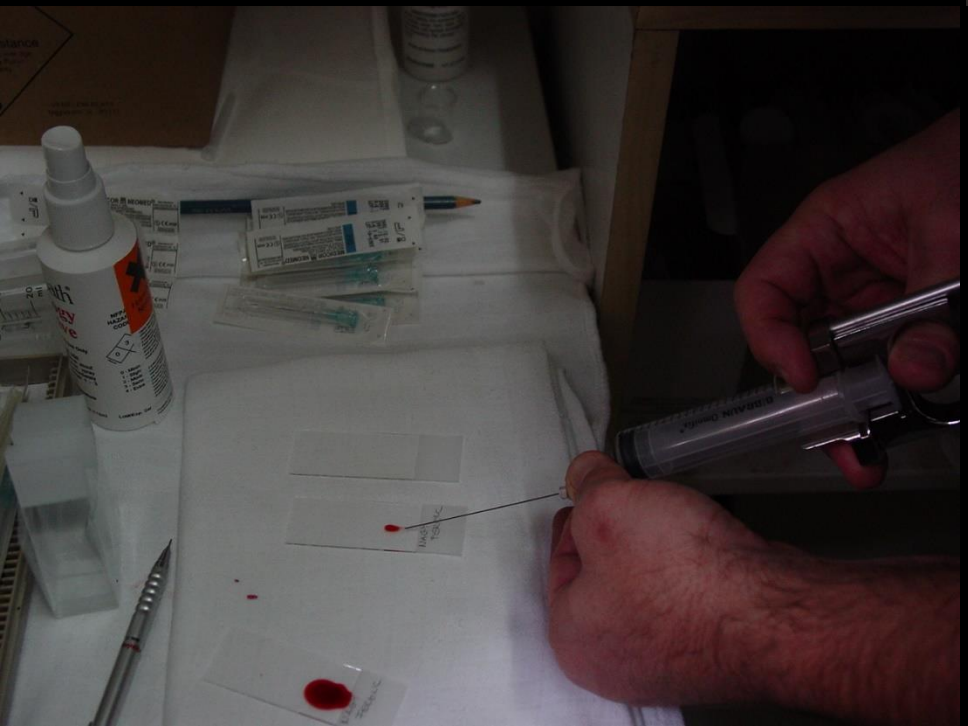


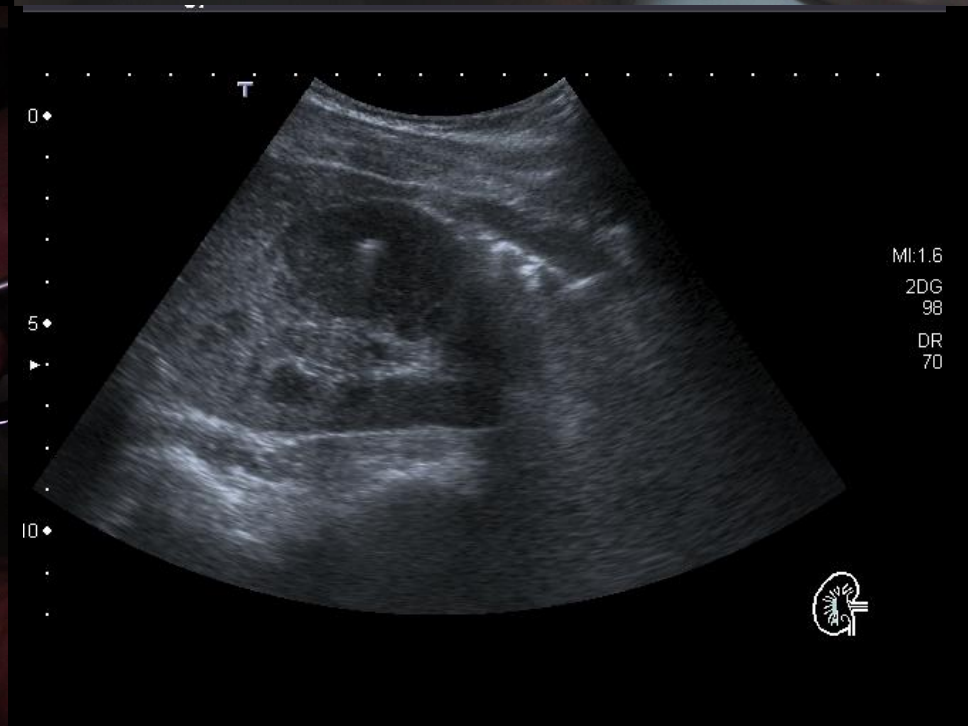








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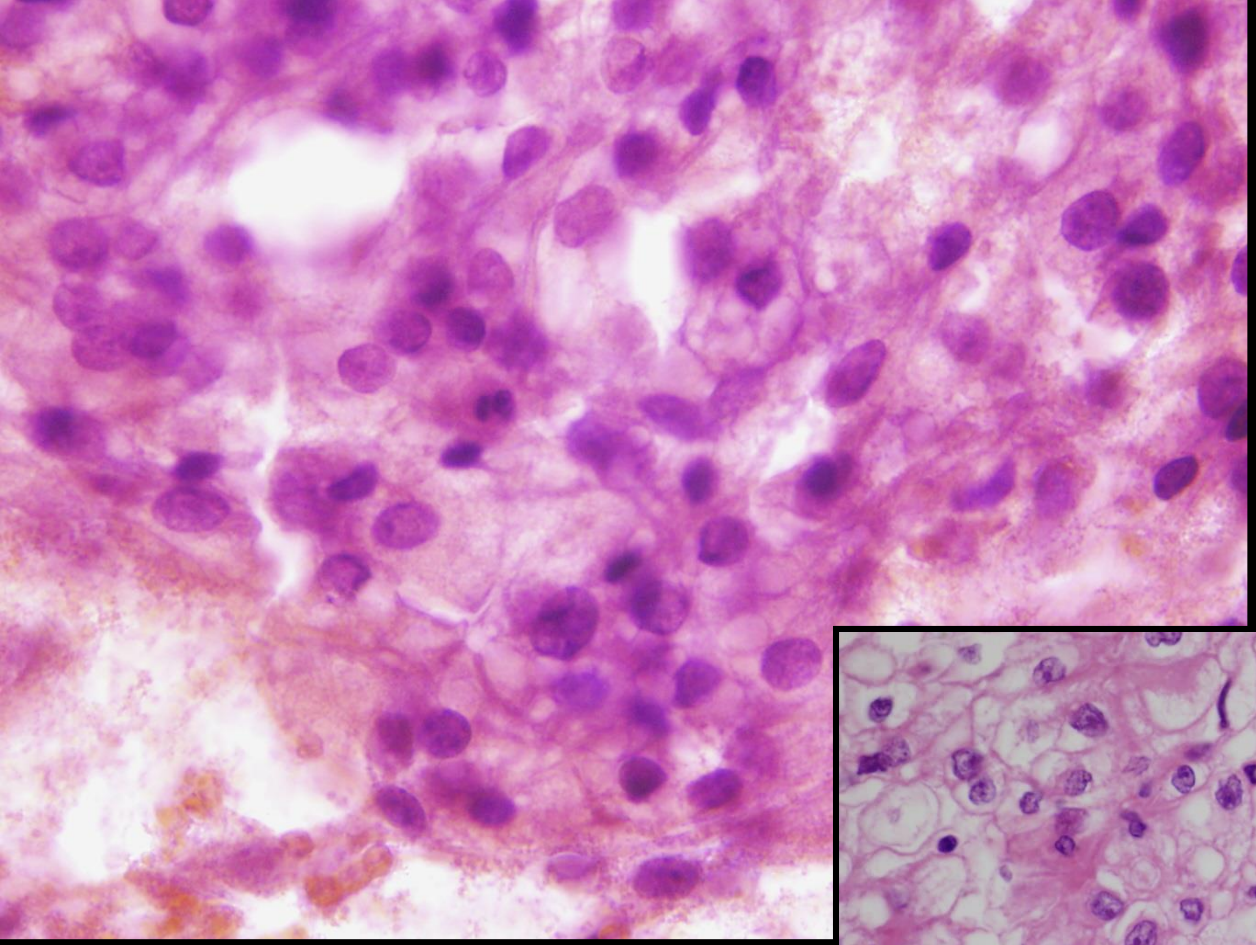
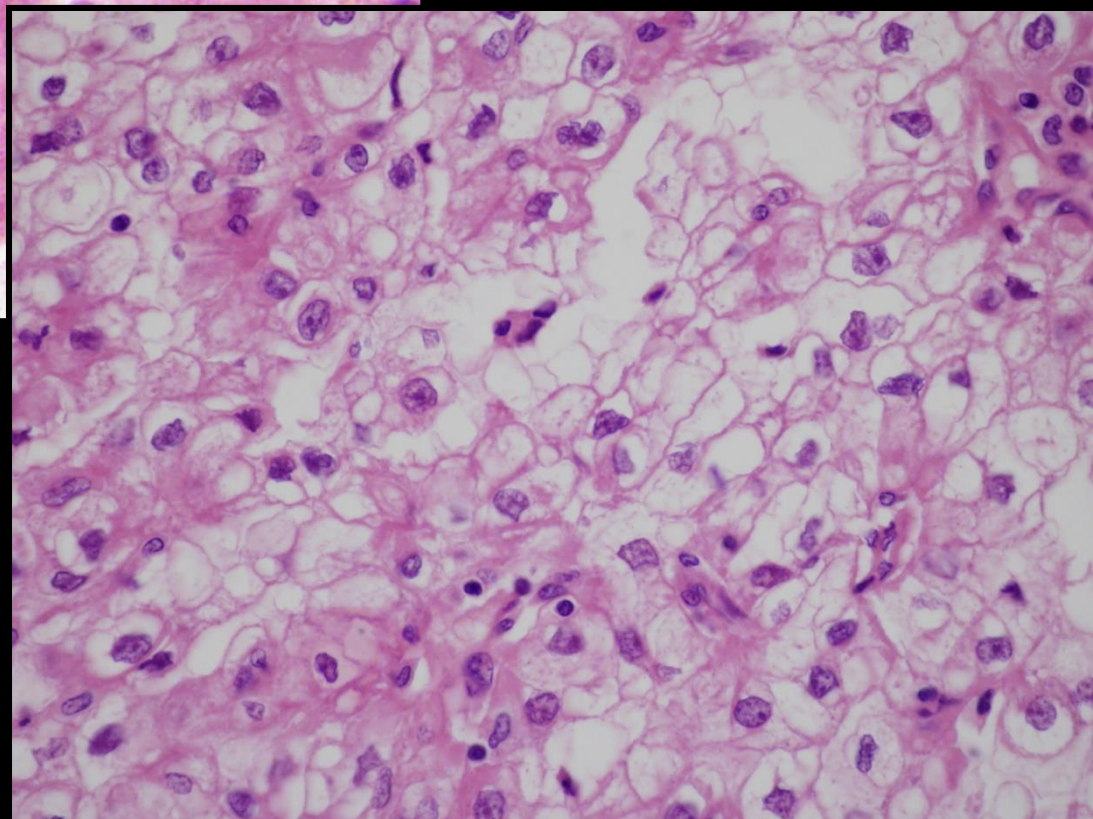
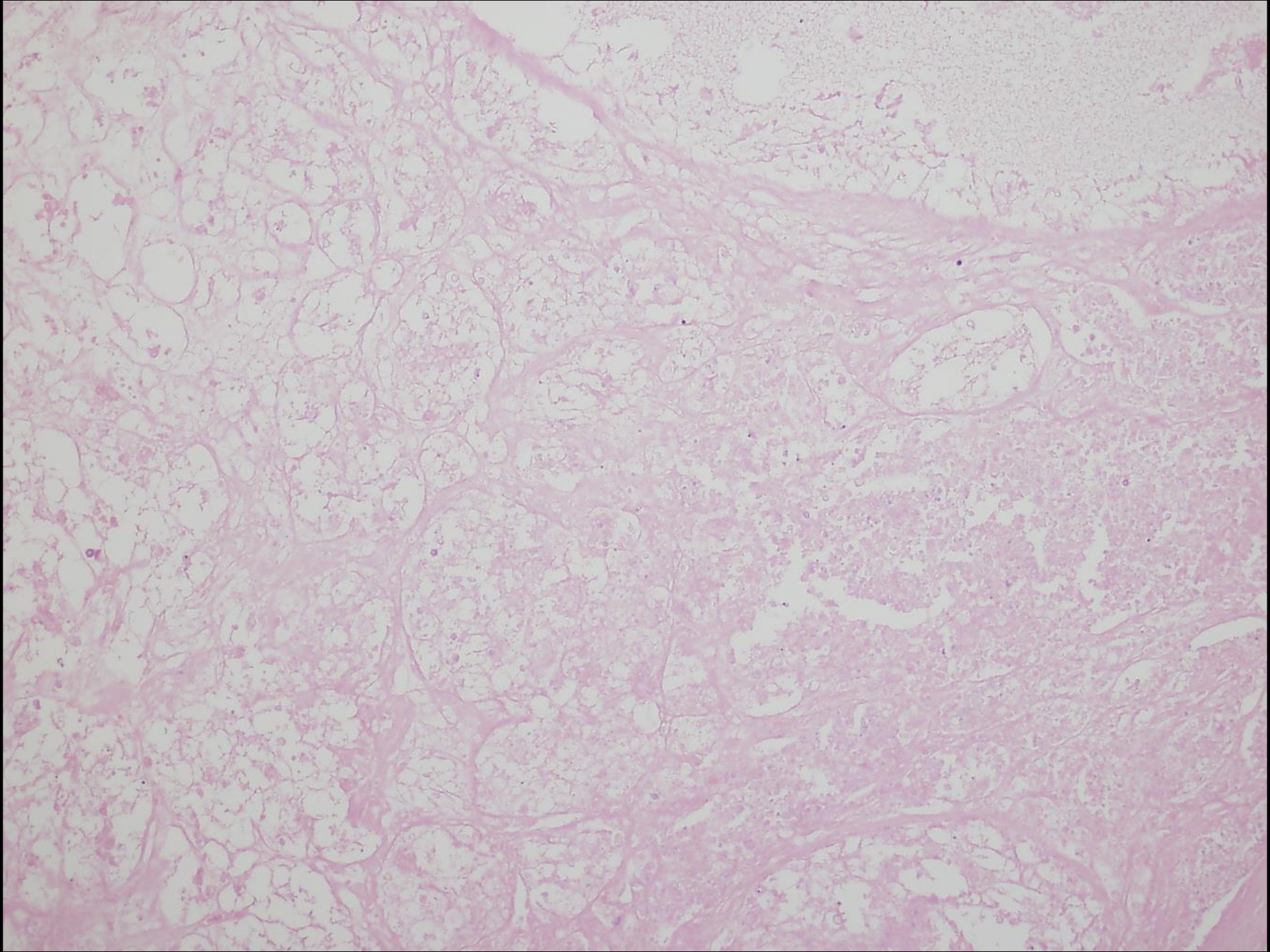
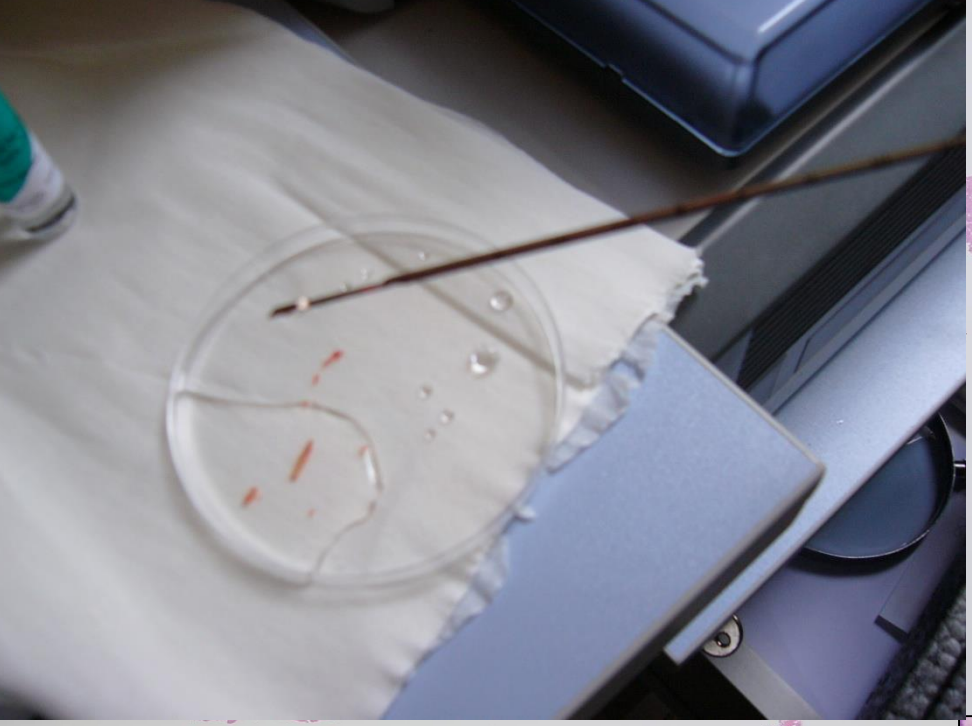
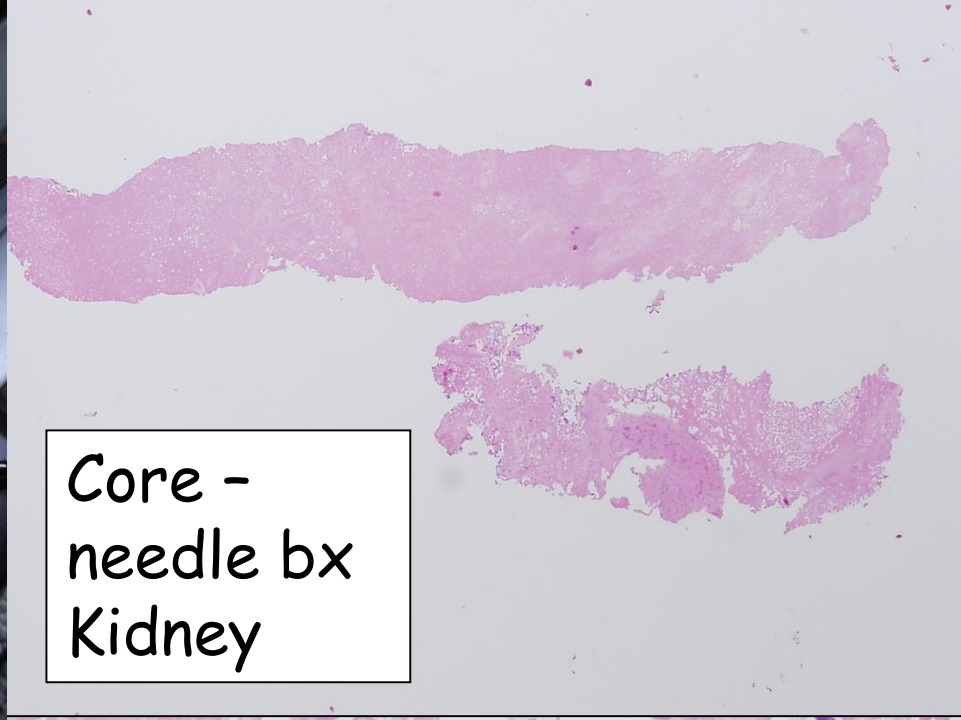
MI:1.6
2DG
98
DR
70



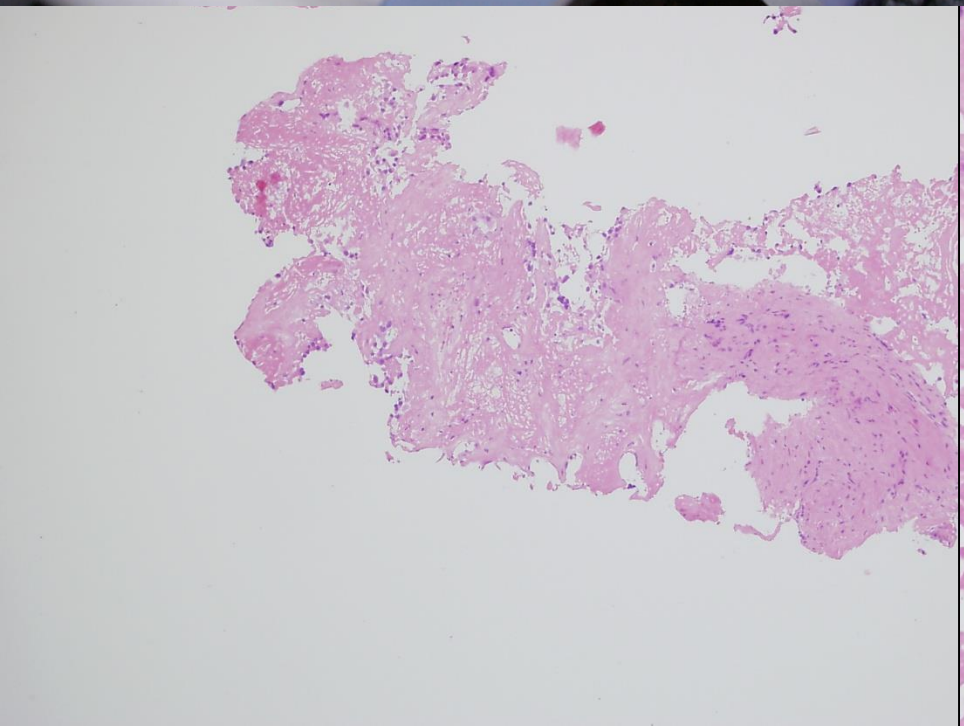


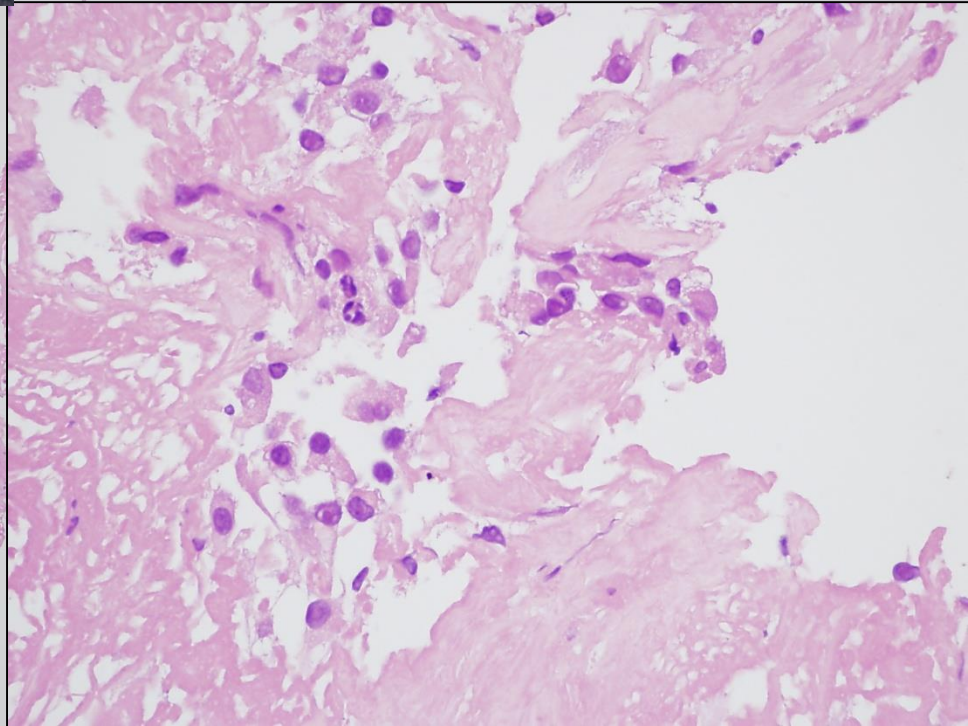






Core – needle bx Kidney



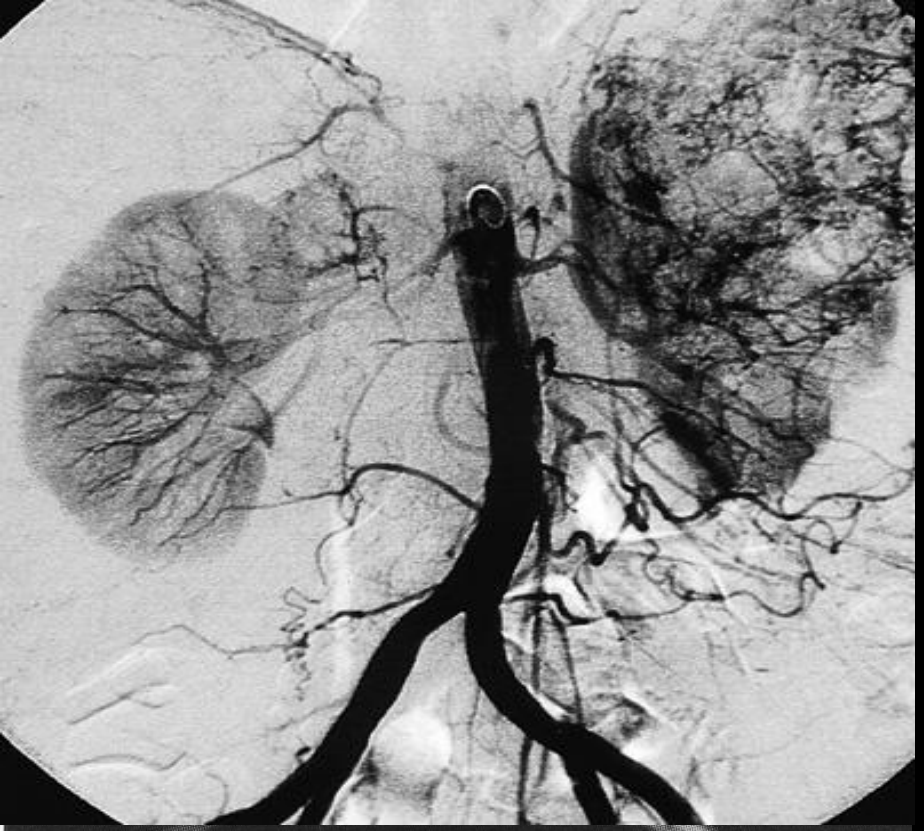


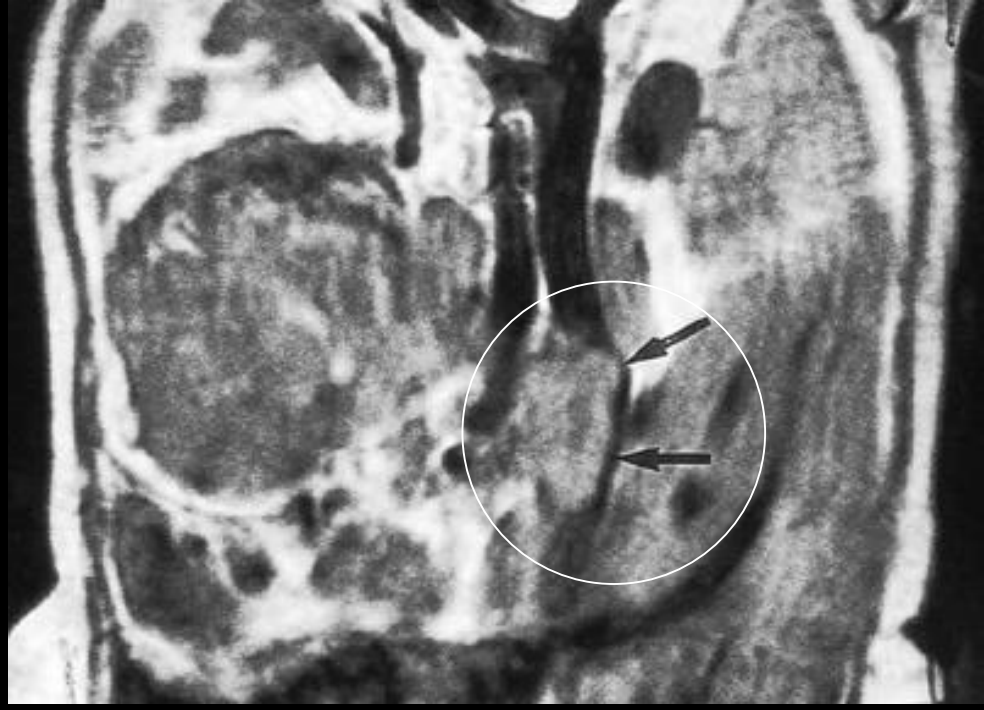
Characteristics of renal cell cancer

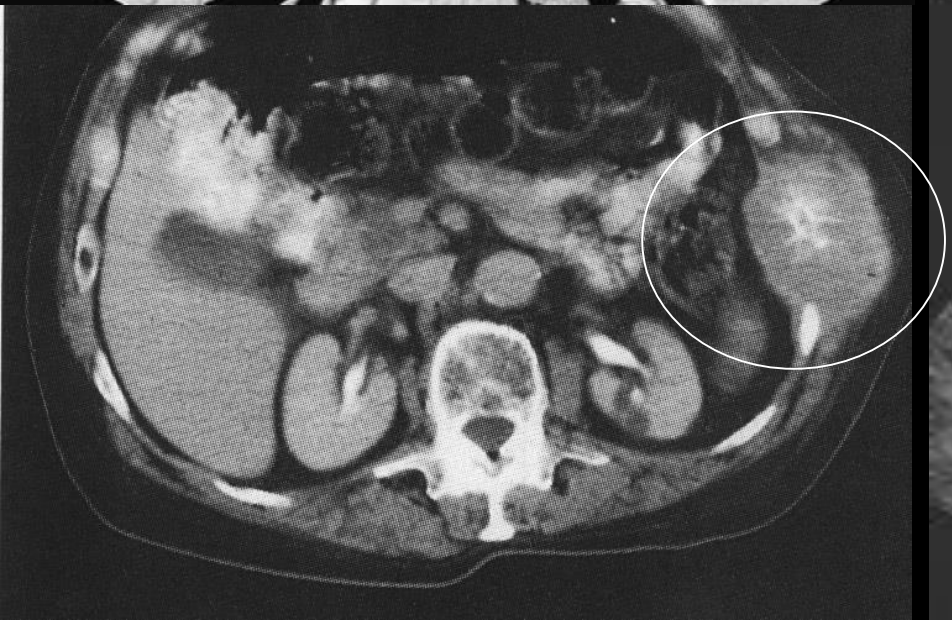
- Clear „plant-like" cells
- Widespread paraneoplasticus signs
- Blood vessel invasion
- Widespread metastases,

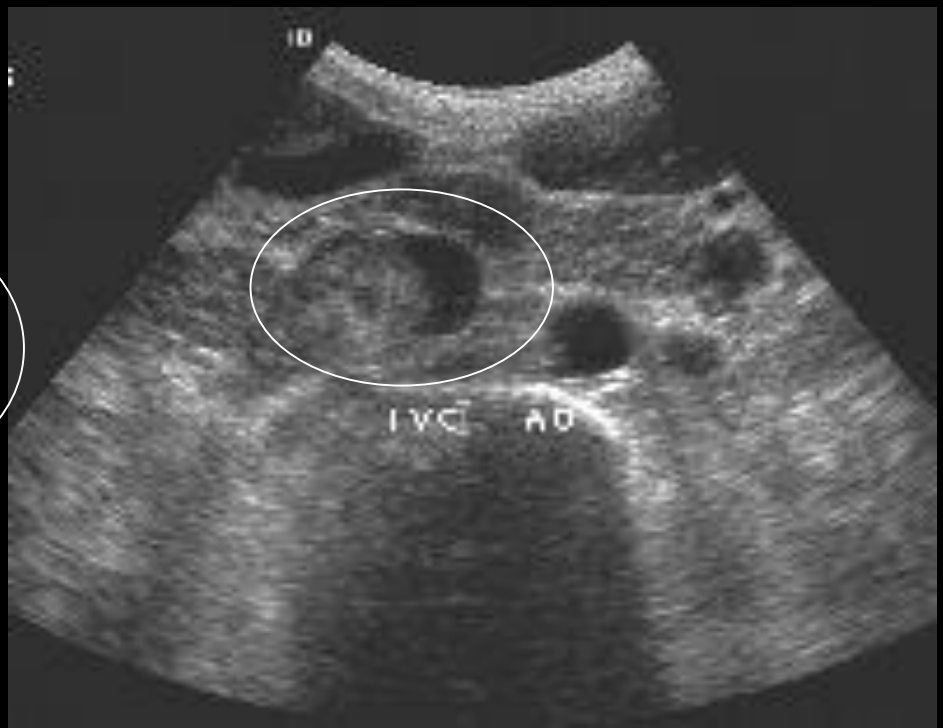
anytime,

anywhere (reg. Ln-s, adrenals,lung, brain, bones, thyroid, skin, testis...)





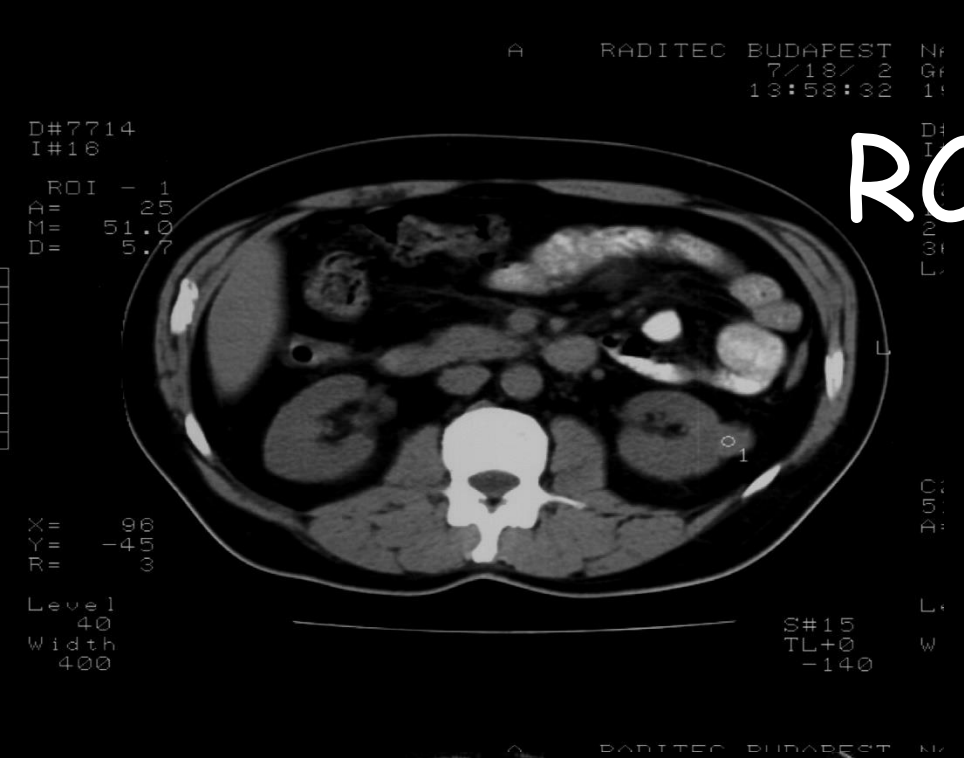



ID
IVC
AO

Paraneoplastic signs:

Polycythemia
Hypercalcaemia
Hypertension
Hepatic dysfunction
Feminisation/Masculinisation
Cushing syndrome
Eosinophily
Leukemoid reaction
Amyloidosis

RCC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ROI - 1
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M= 51.0
D= 5.7
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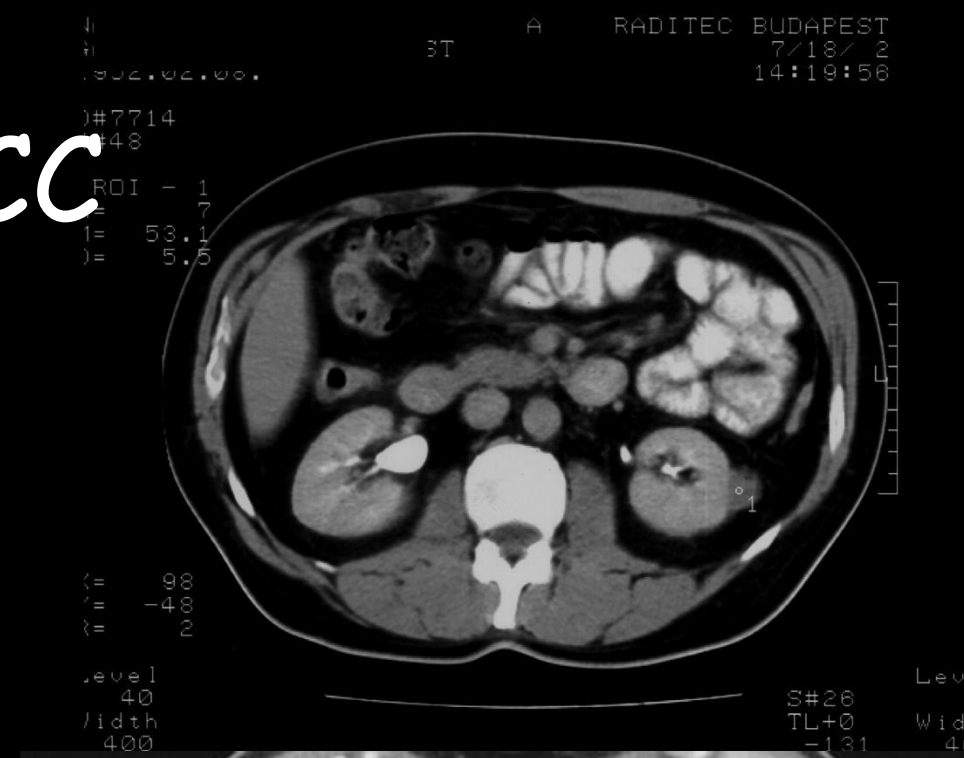
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7/18/ 2
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5.5
98
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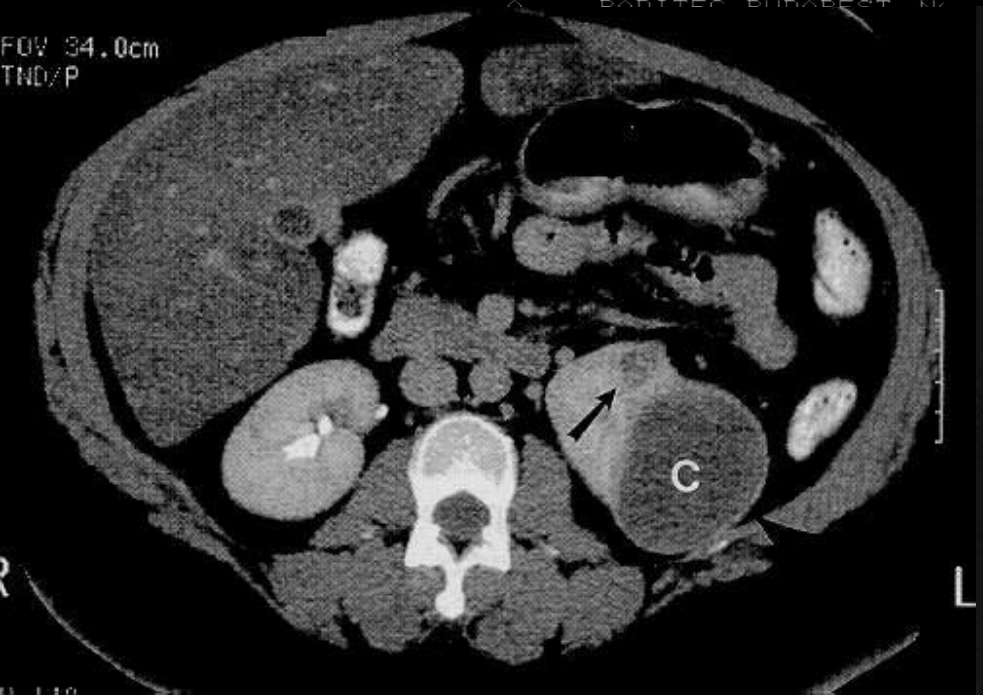
2
S#26
TL+0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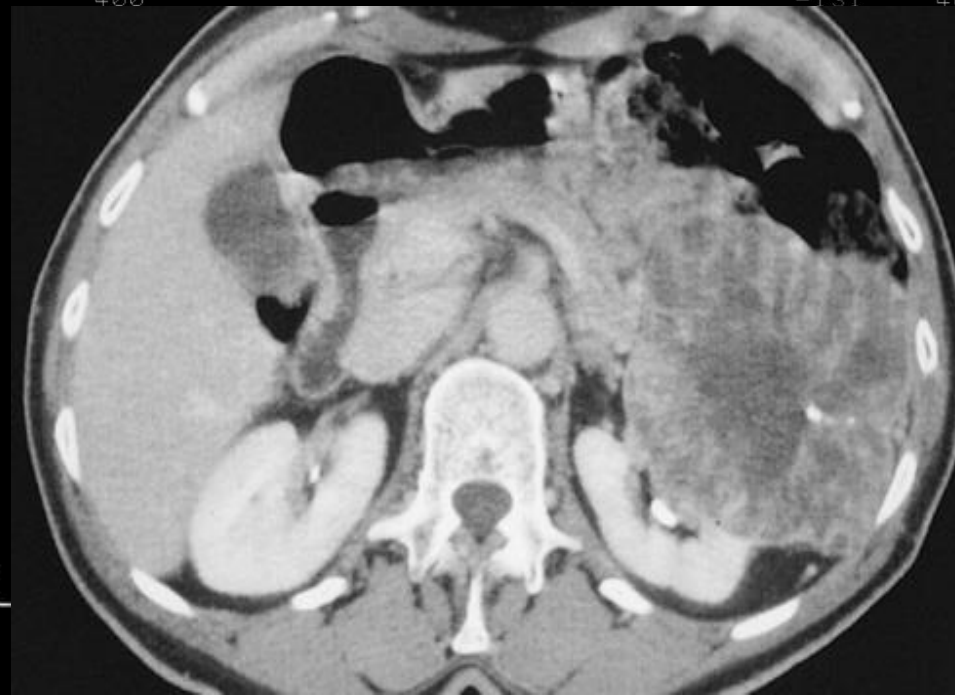

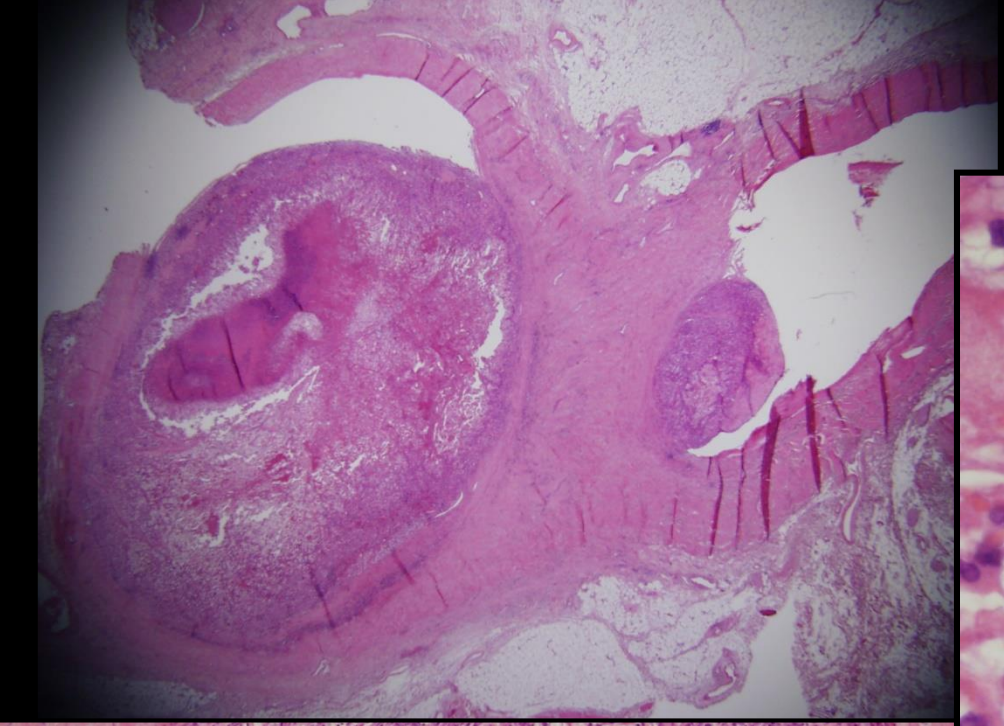

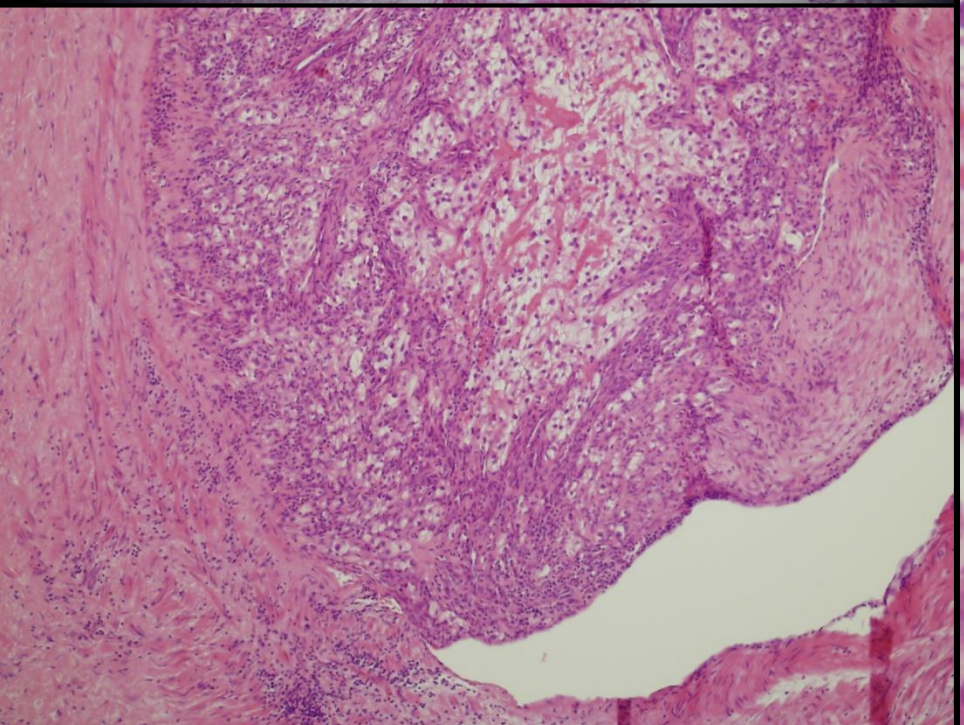

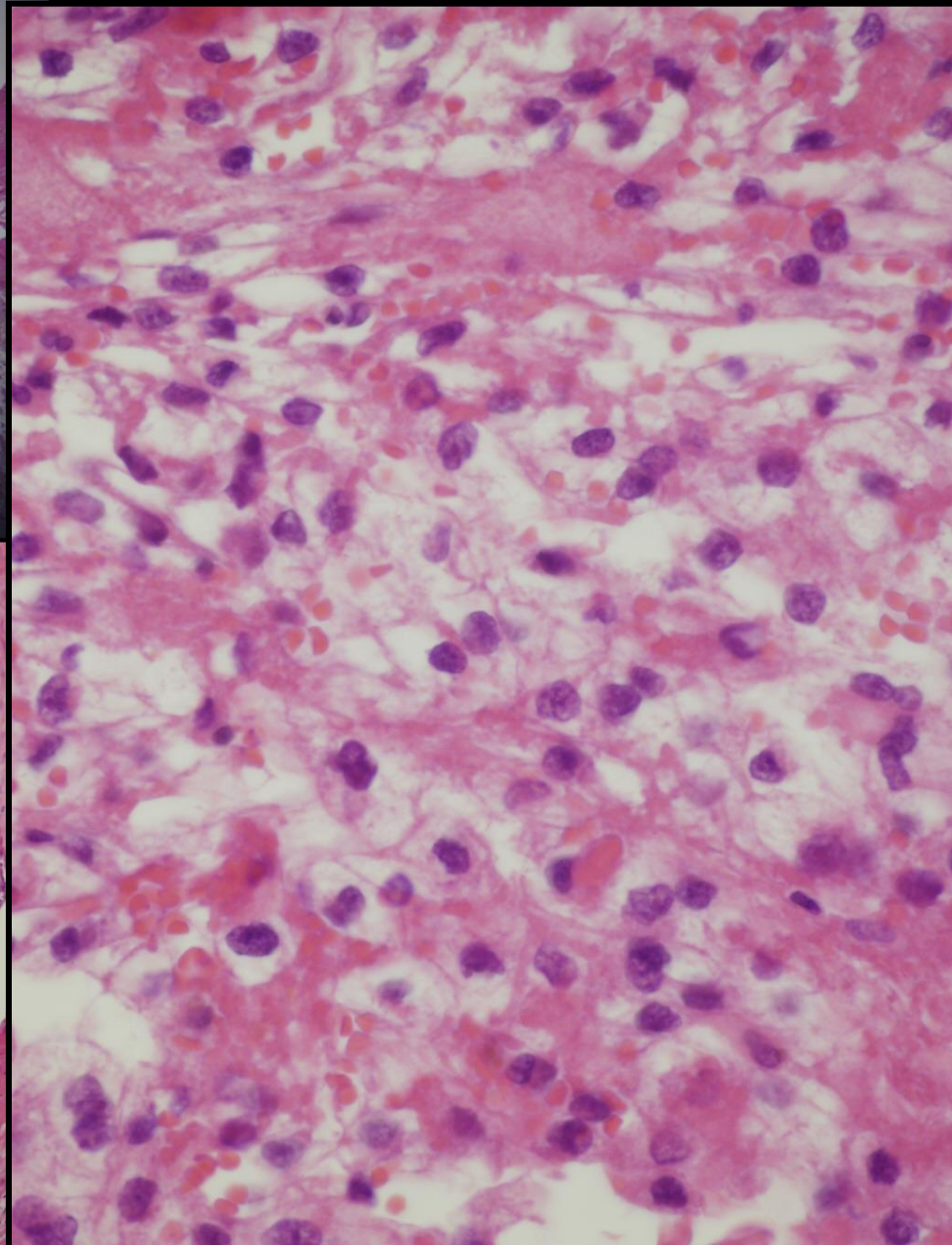

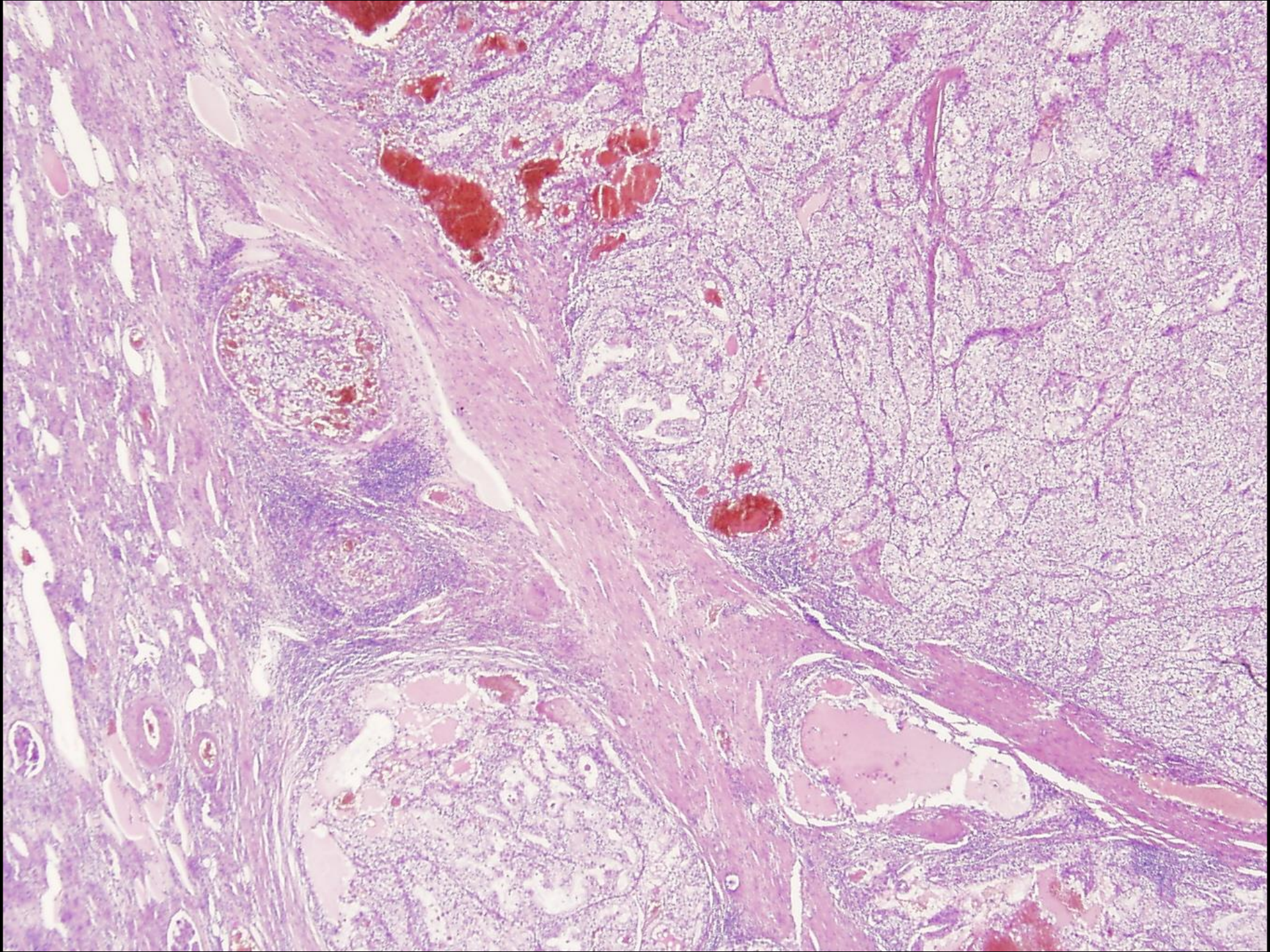

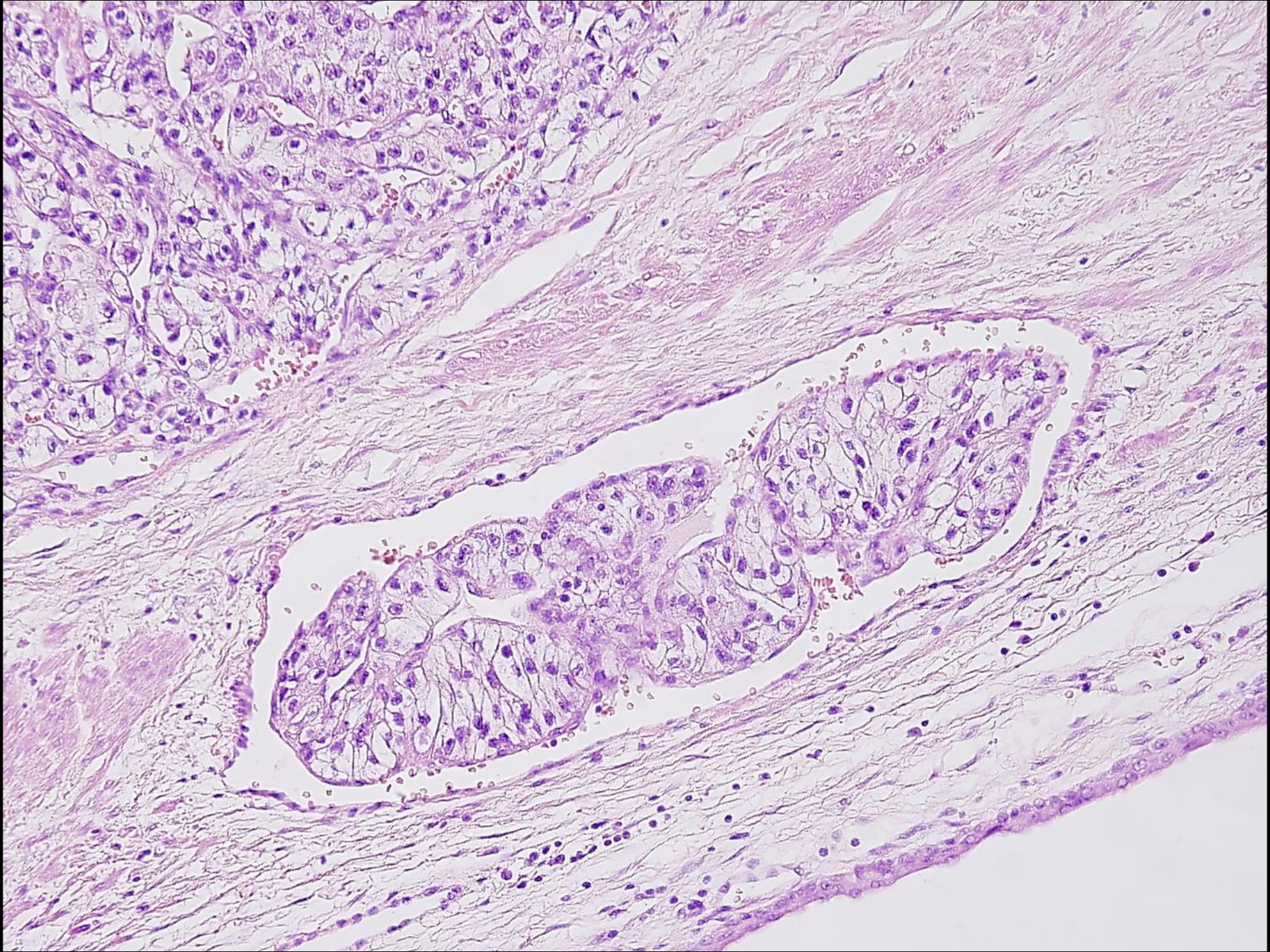

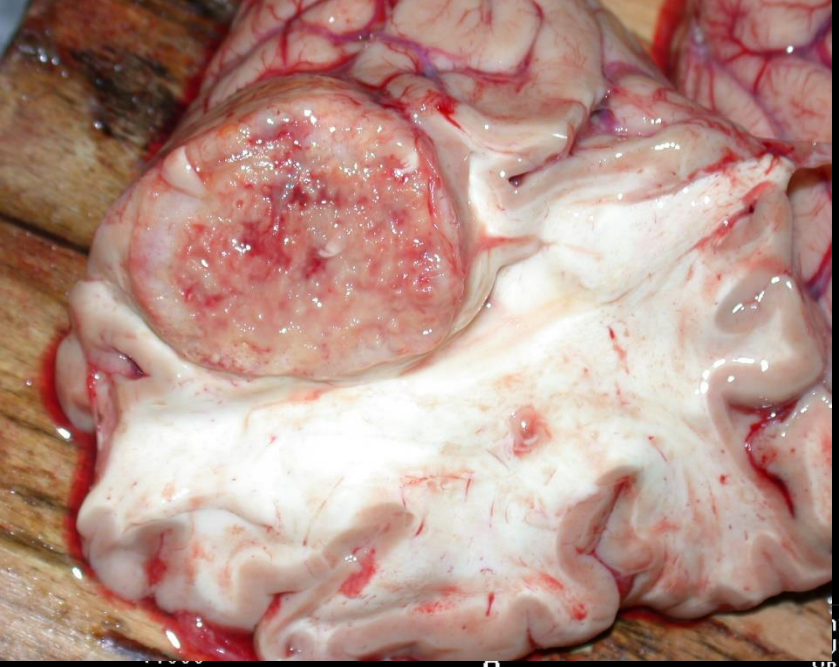

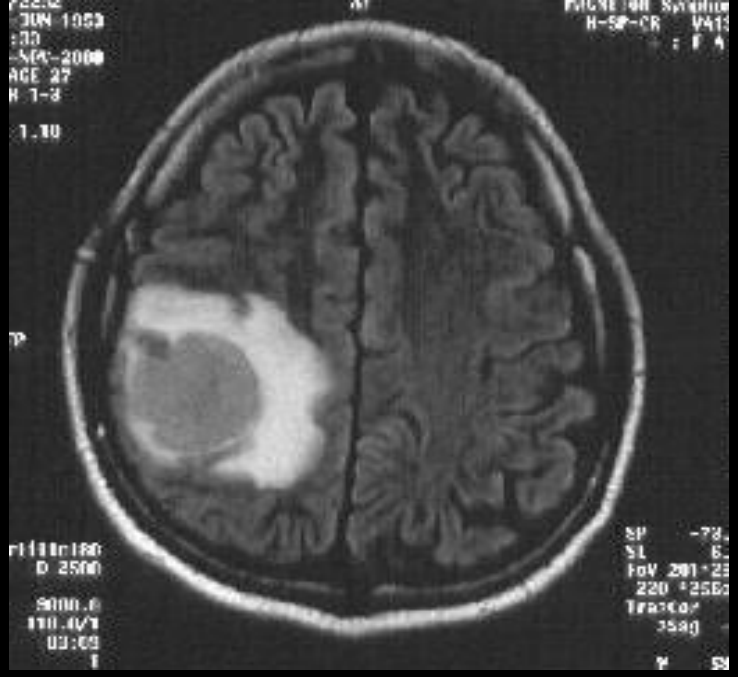

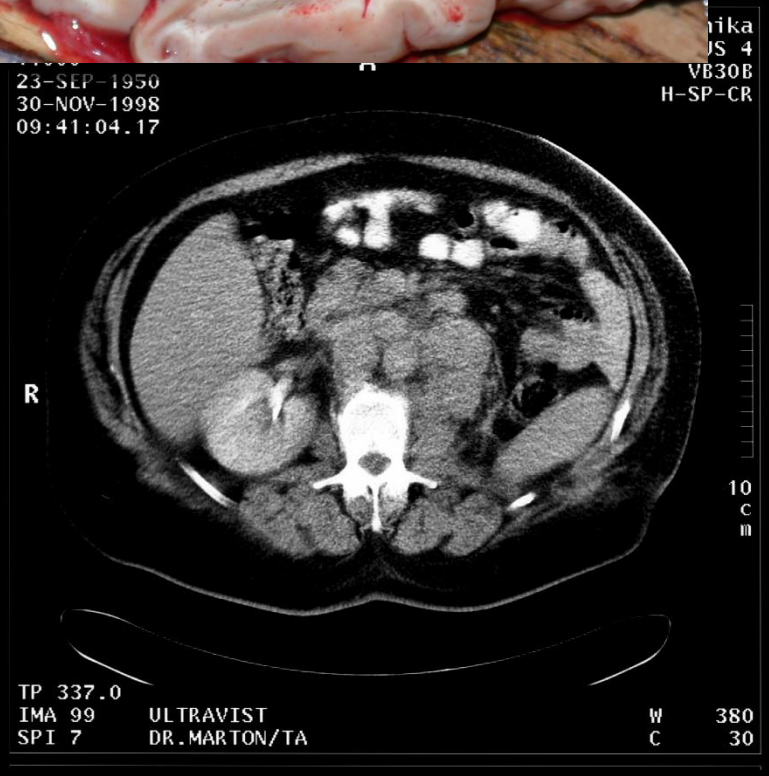
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DR.MARTON/TA
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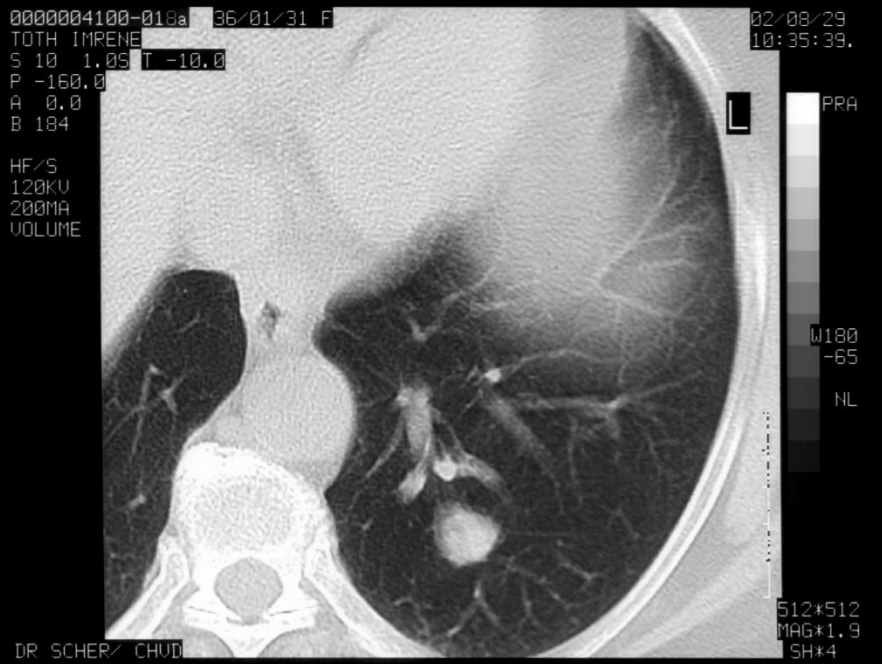
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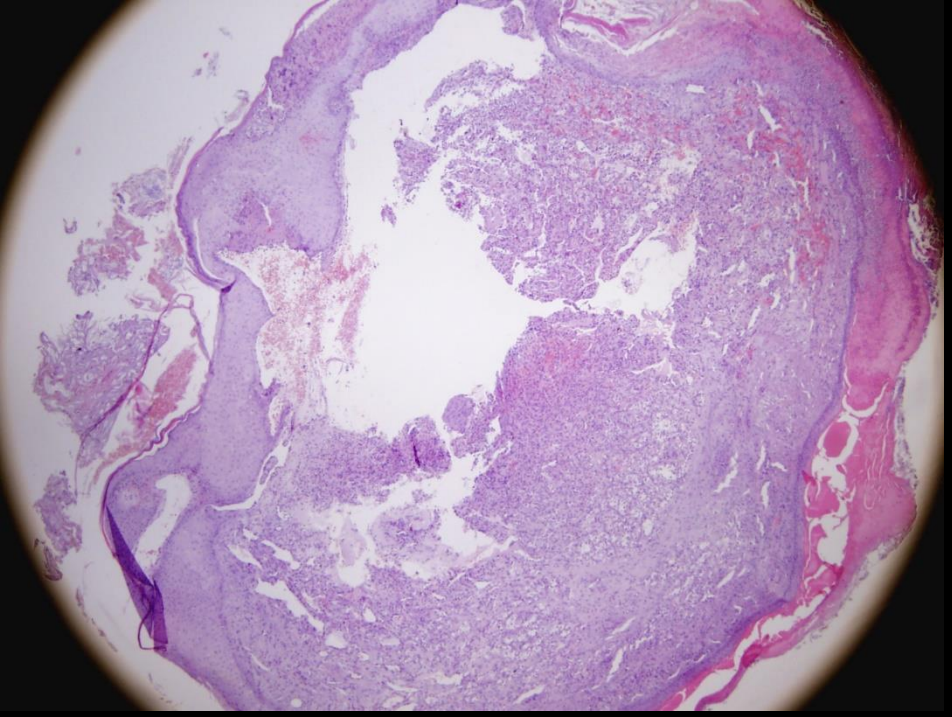
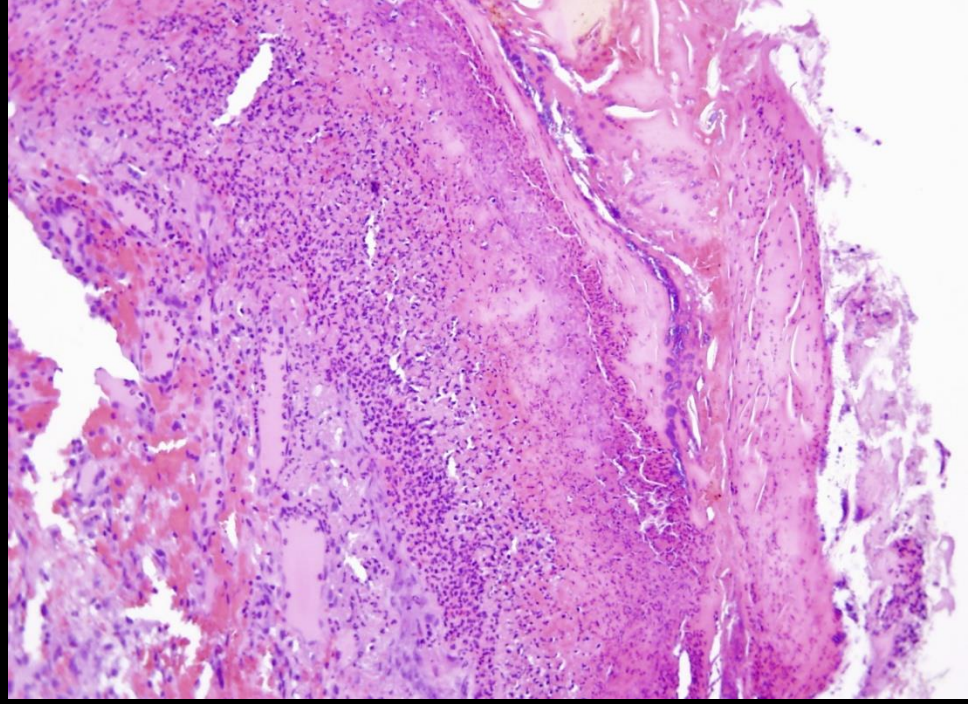
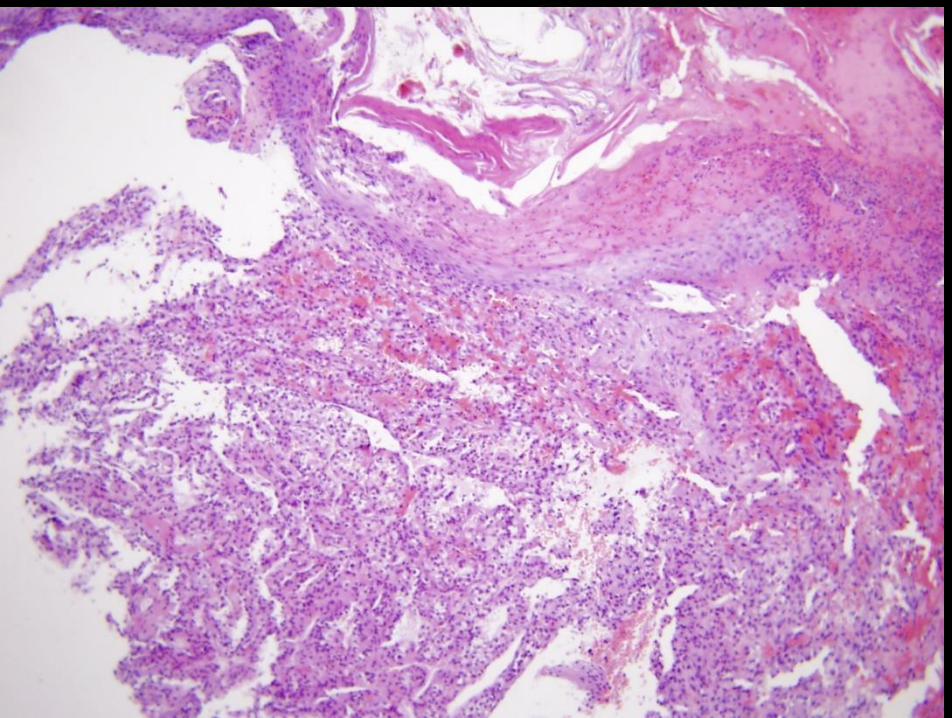
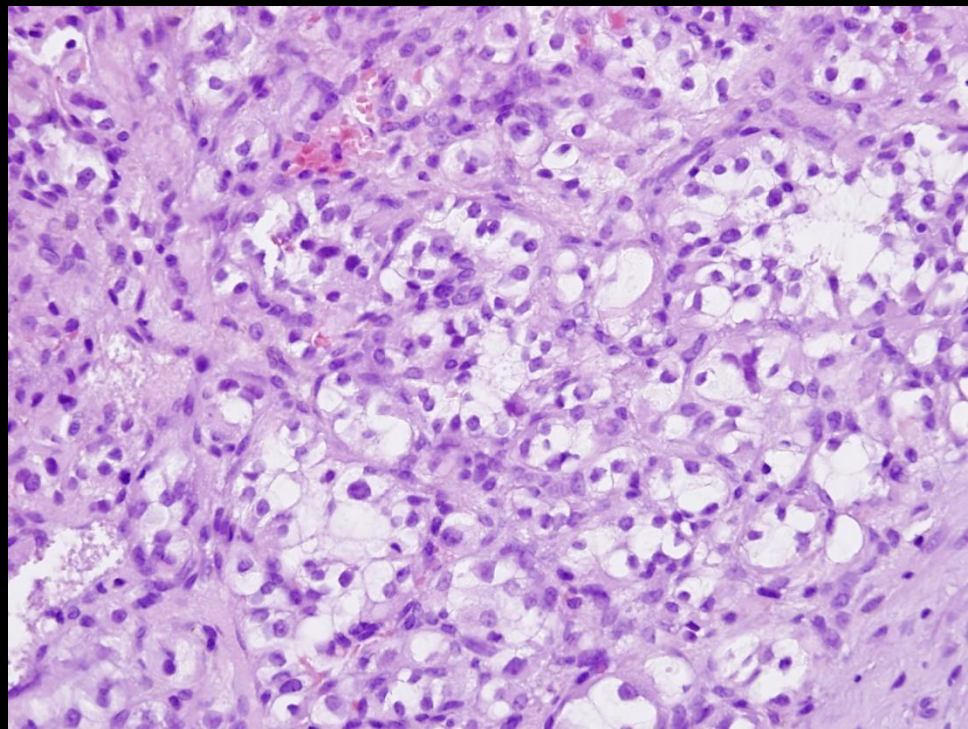
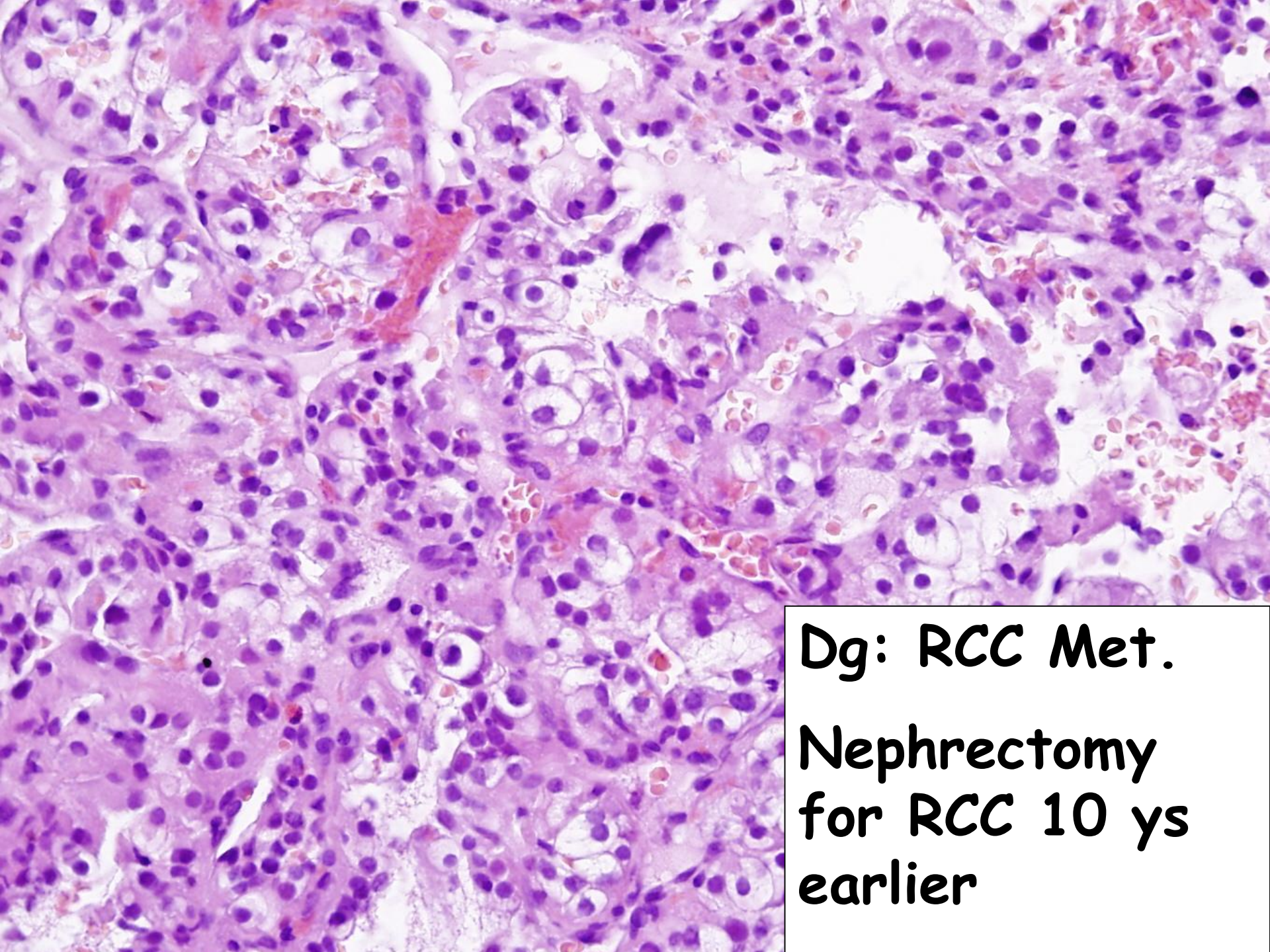
MAG*1.9
SH*4
DR SCHER/ CHUD

Female, 67 y/o

Easily bleeding polypoid mass in the nasal cavity

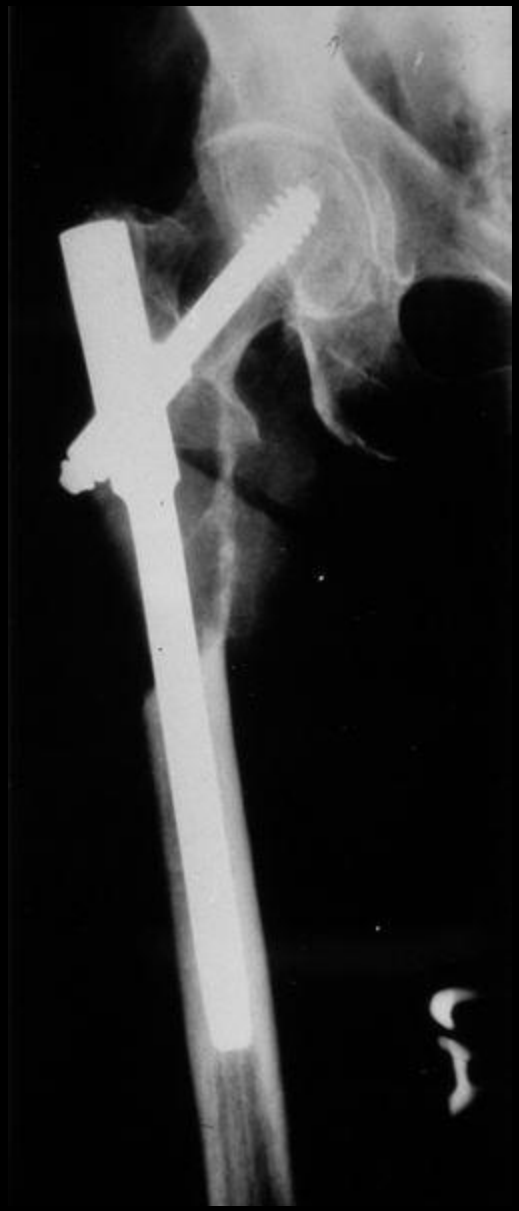
Kl.:Haemangioma?

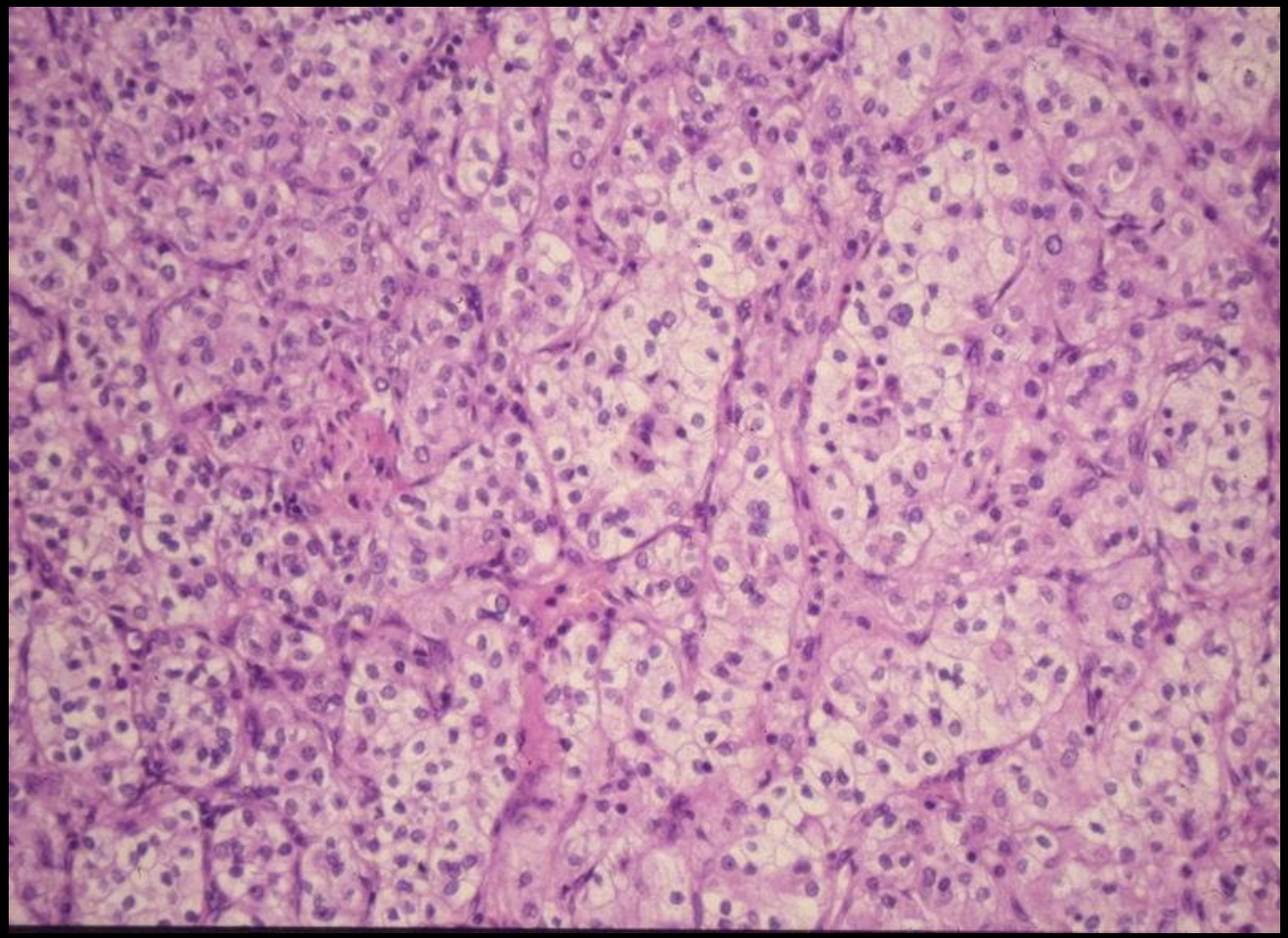







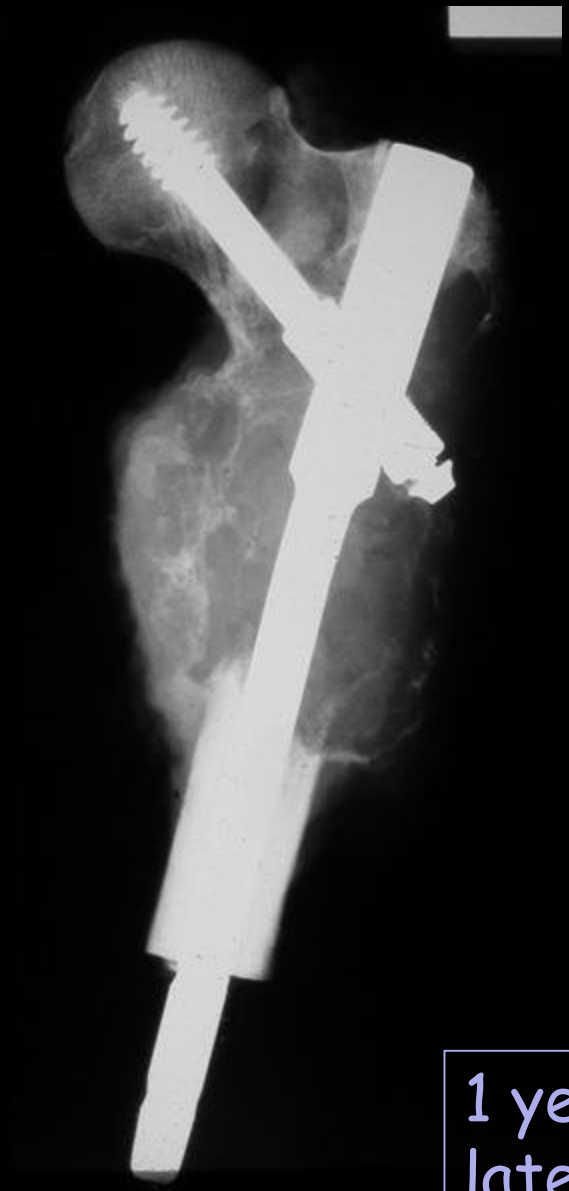
Dg: RCC Met.

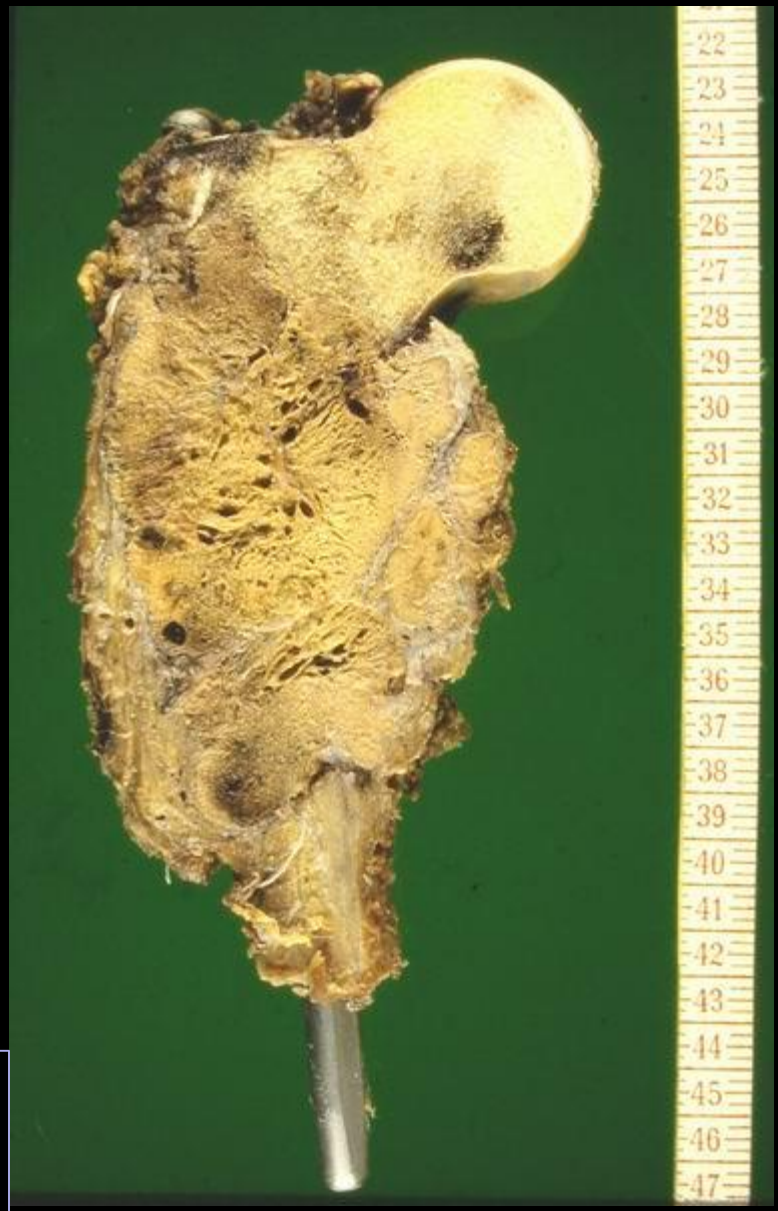
Nephrectomy for RCC 10 ys earlier





Male, 66 y/o pathologic fracture of the femur, 11 years past nephrectoy for RCC

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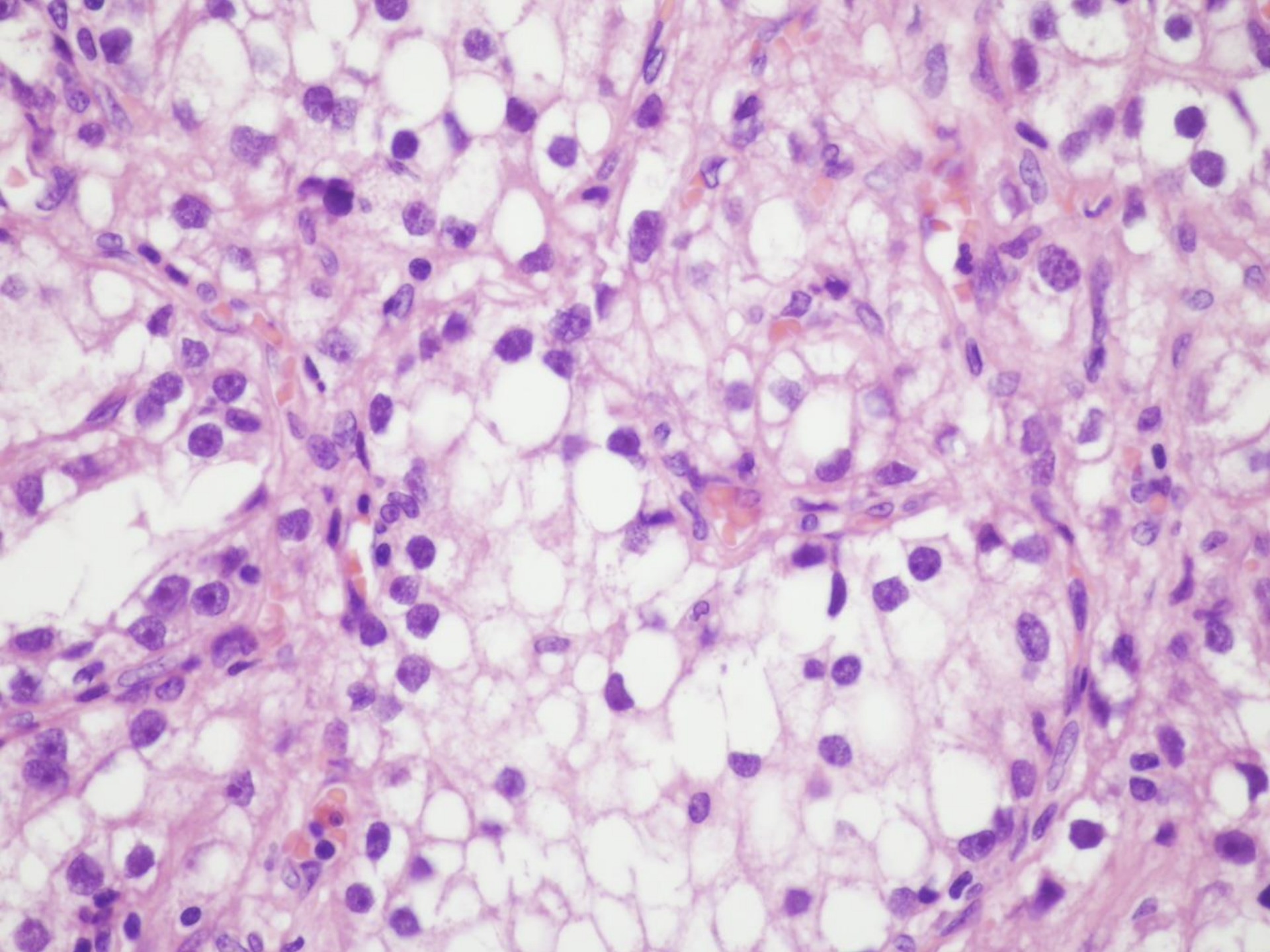
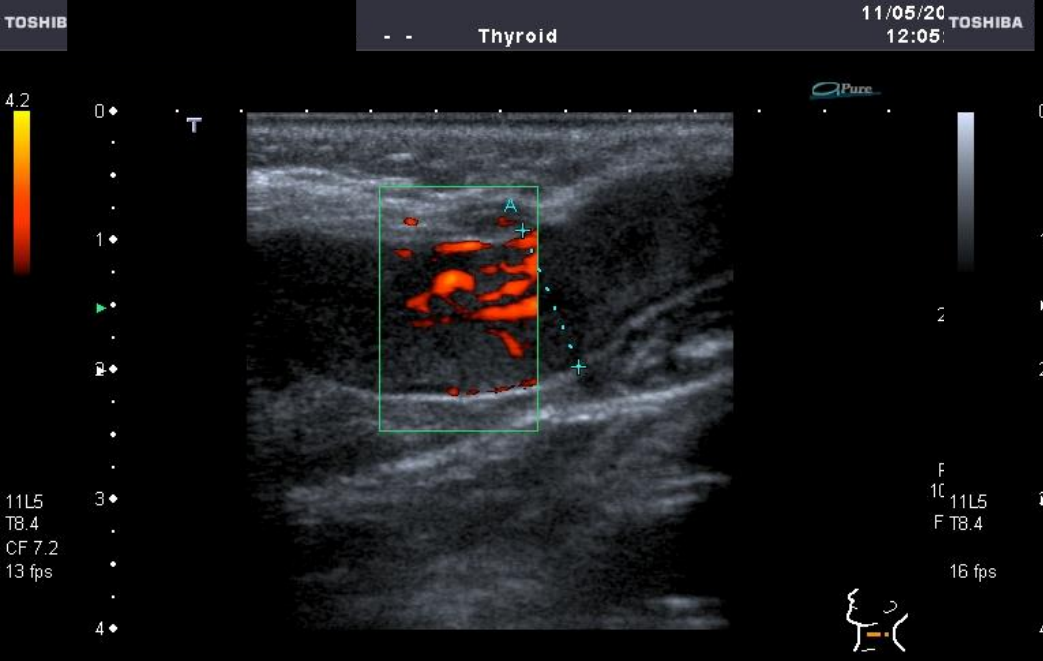
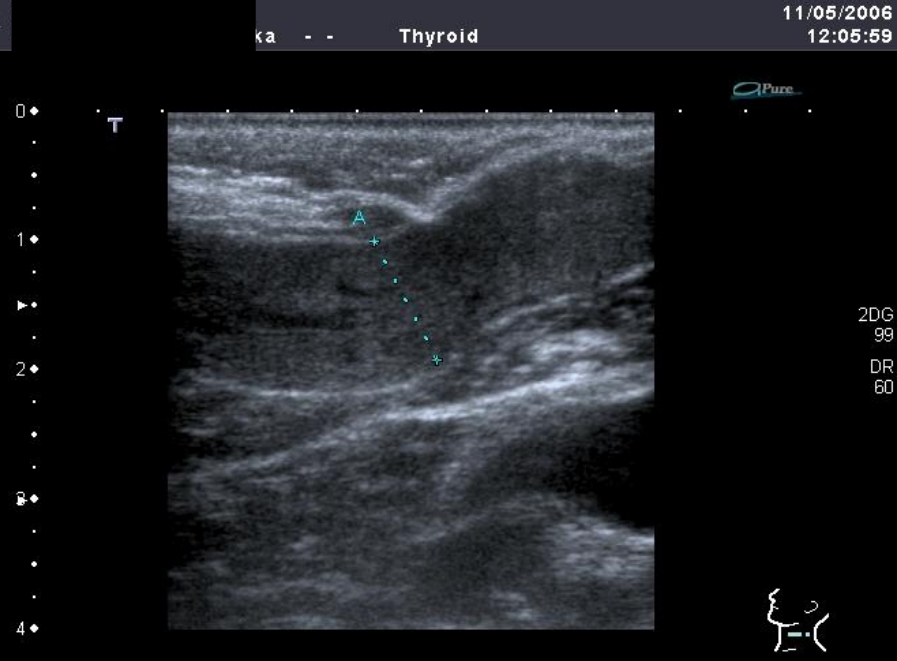
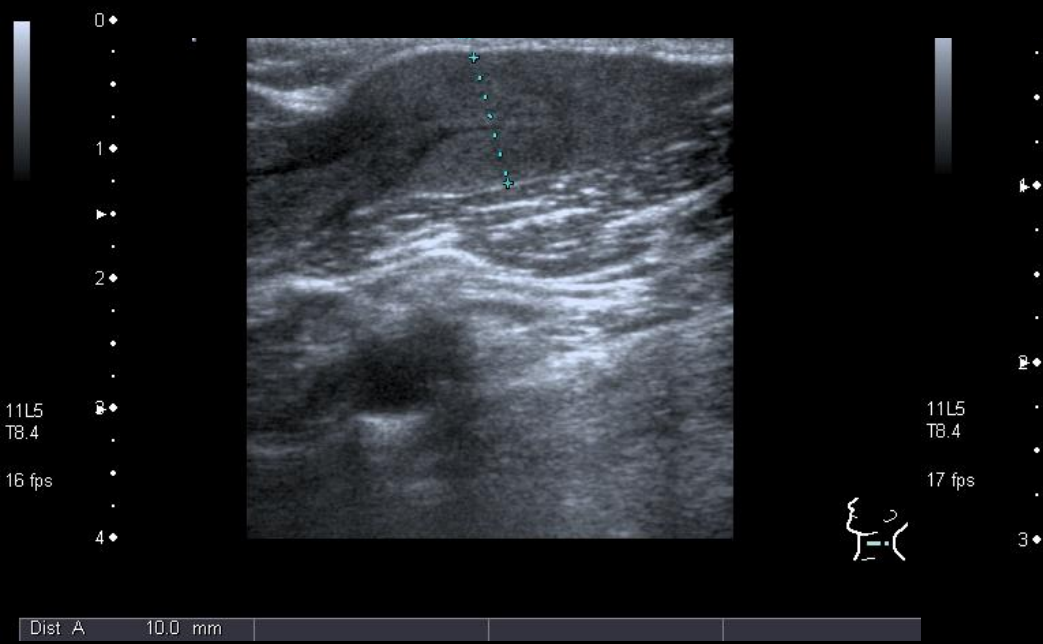
1 year later

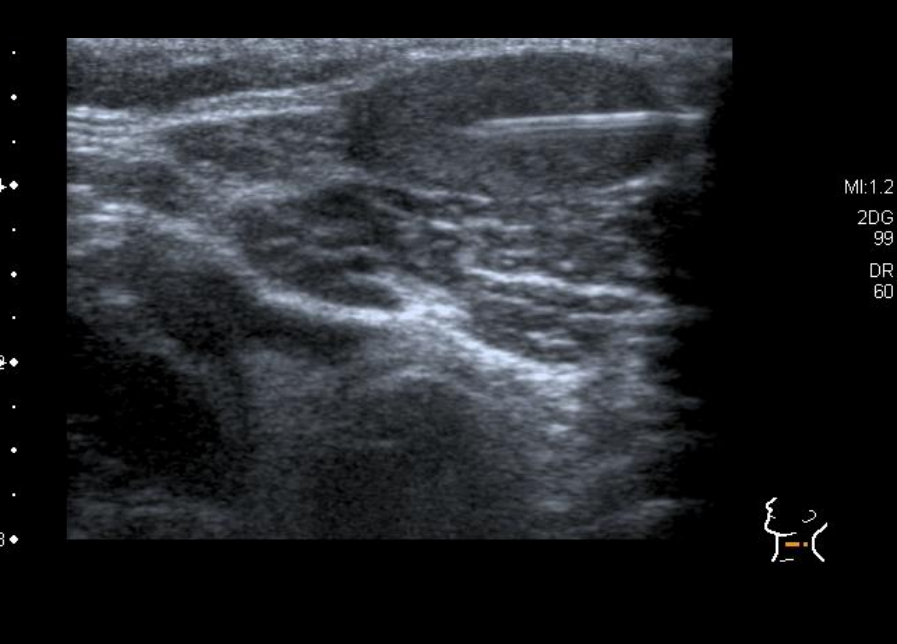




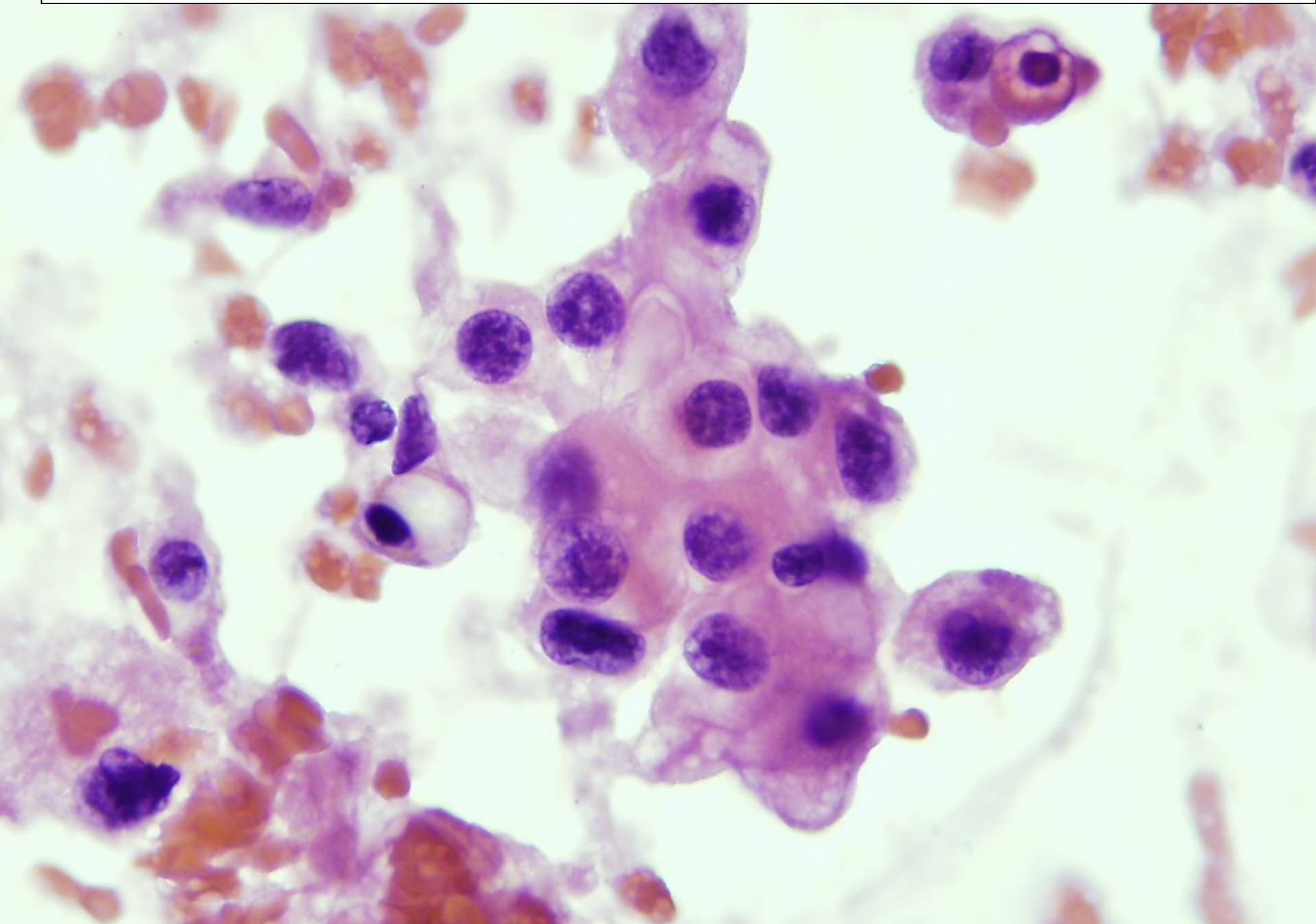


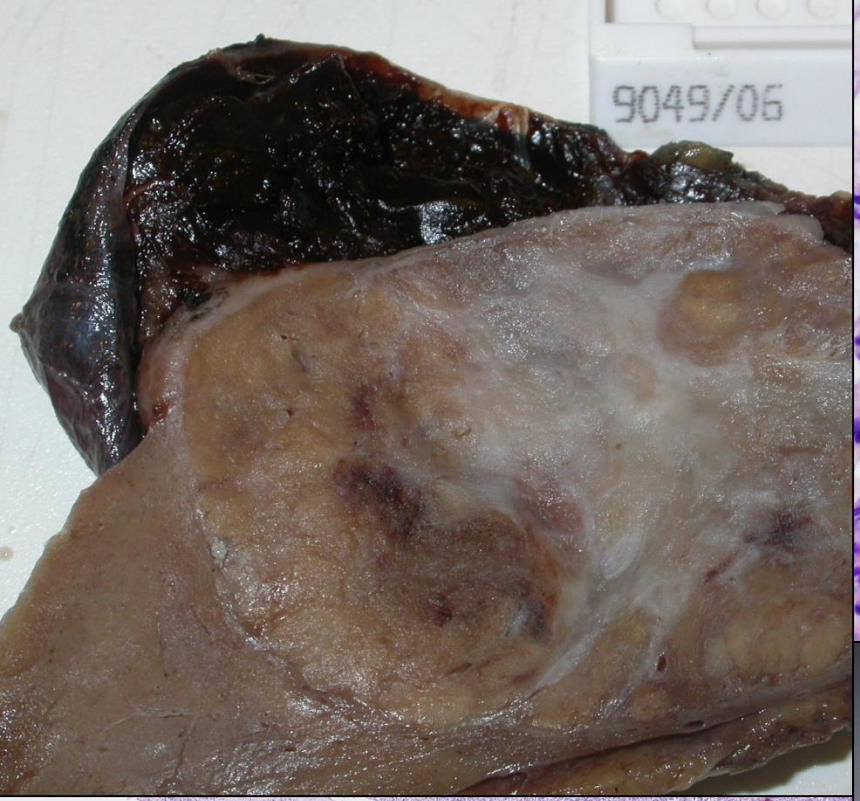
Male, 64 y/o Left sided stiffness on the neck





Dg.: Most probably RCC

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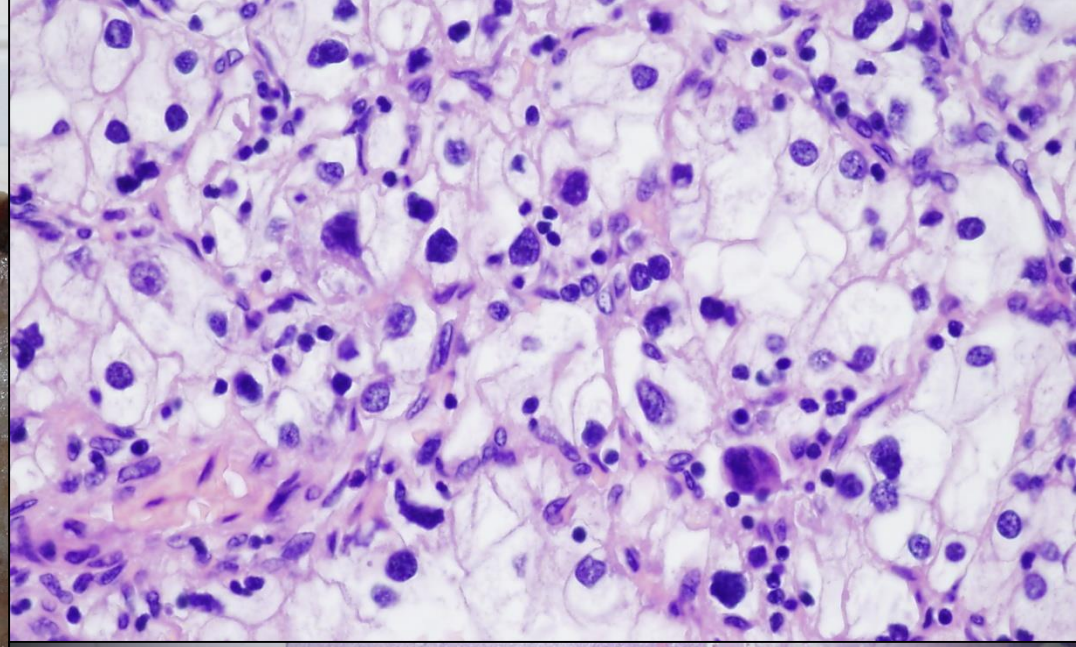
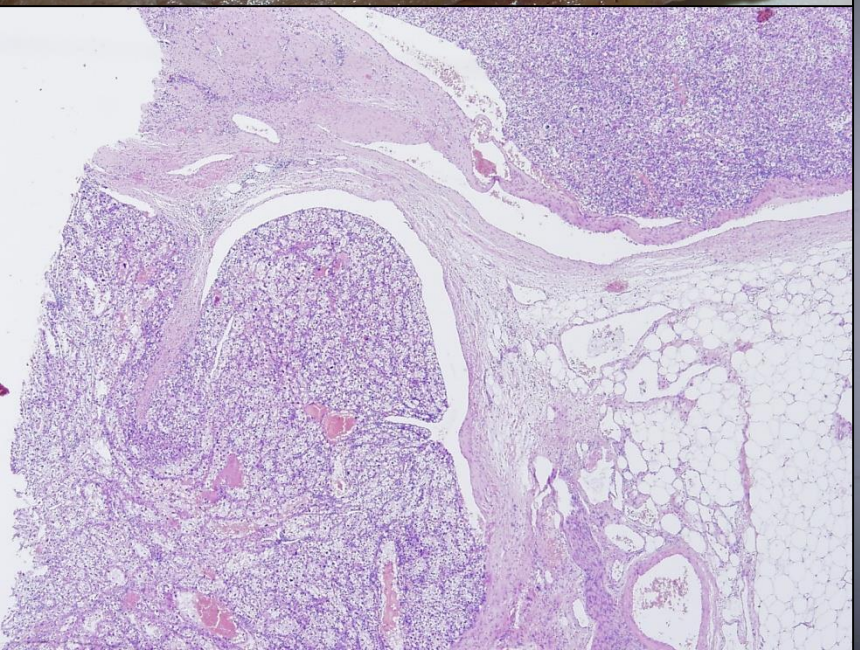
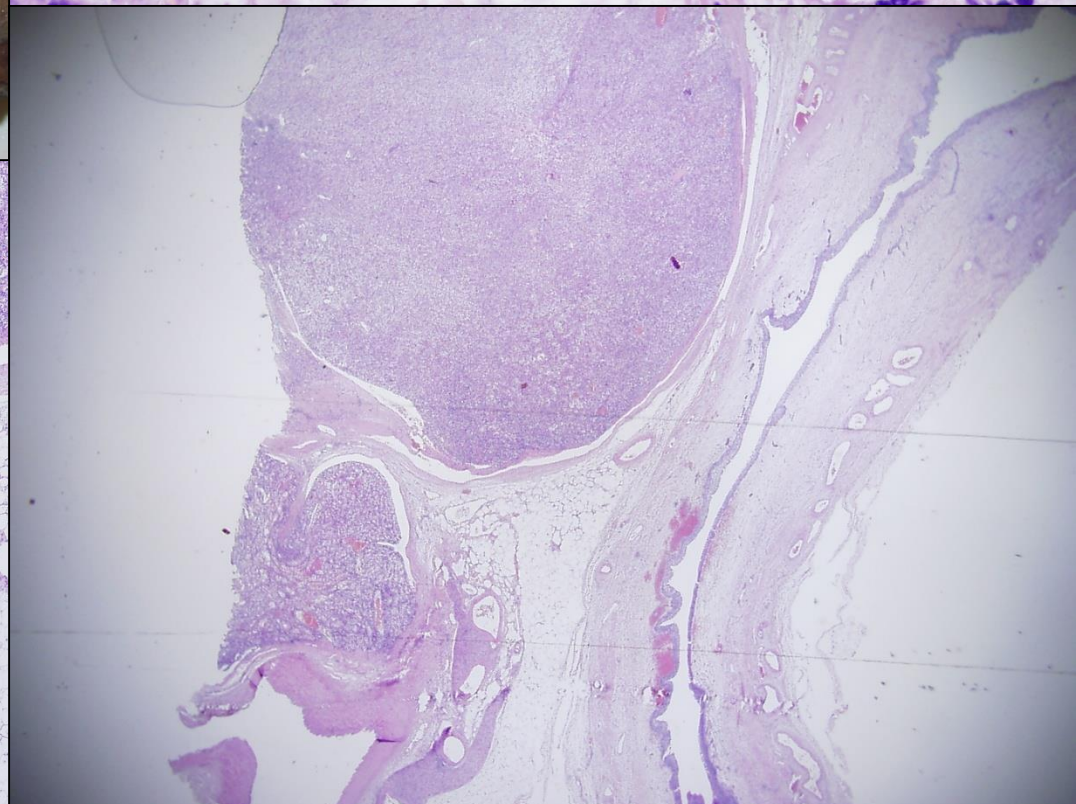
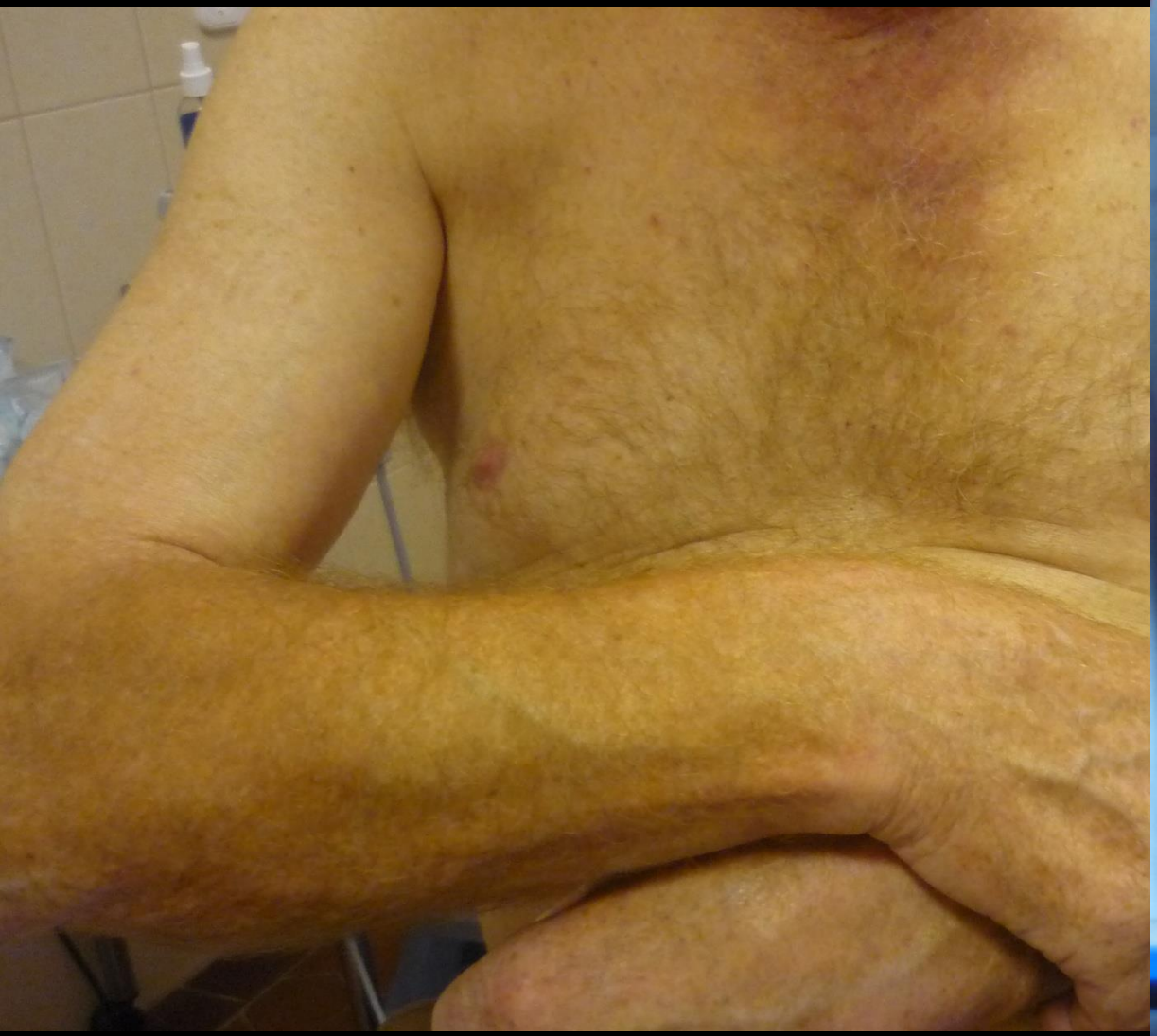
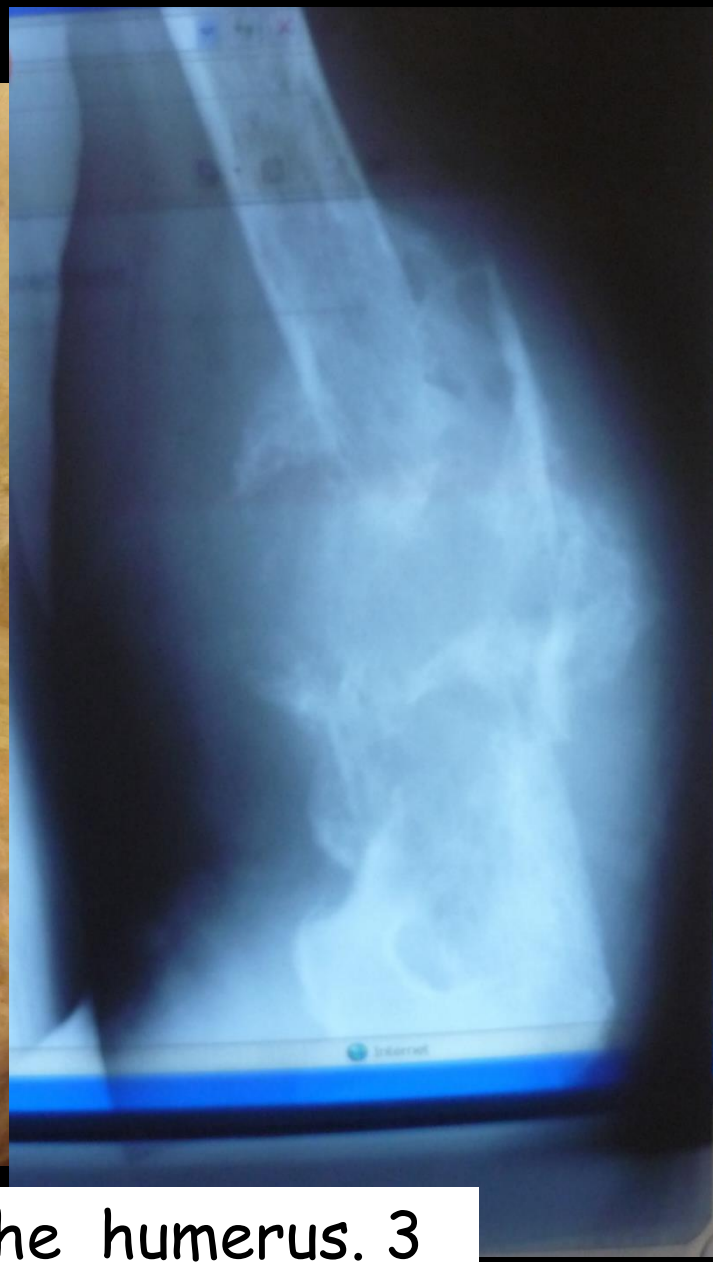


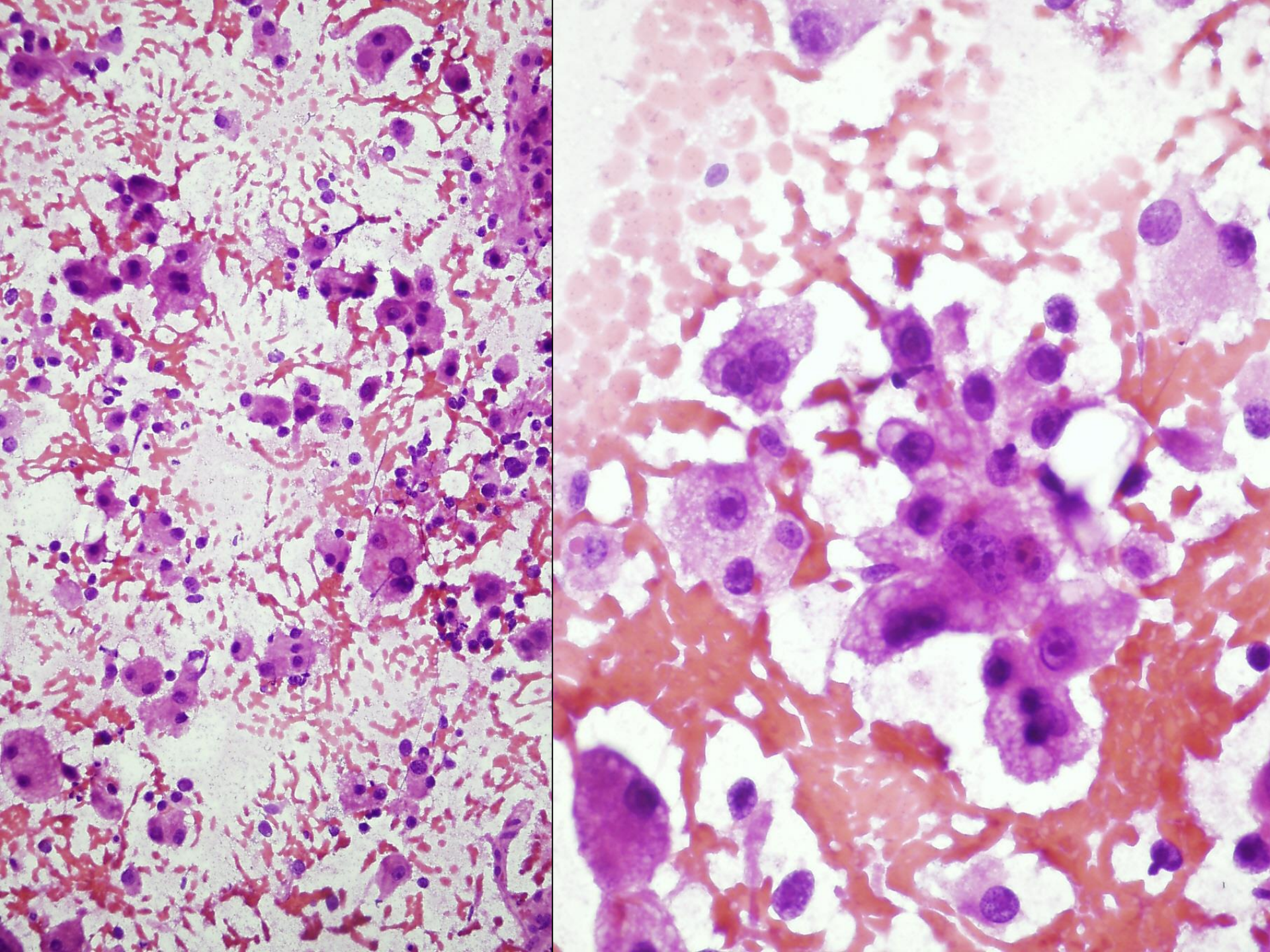


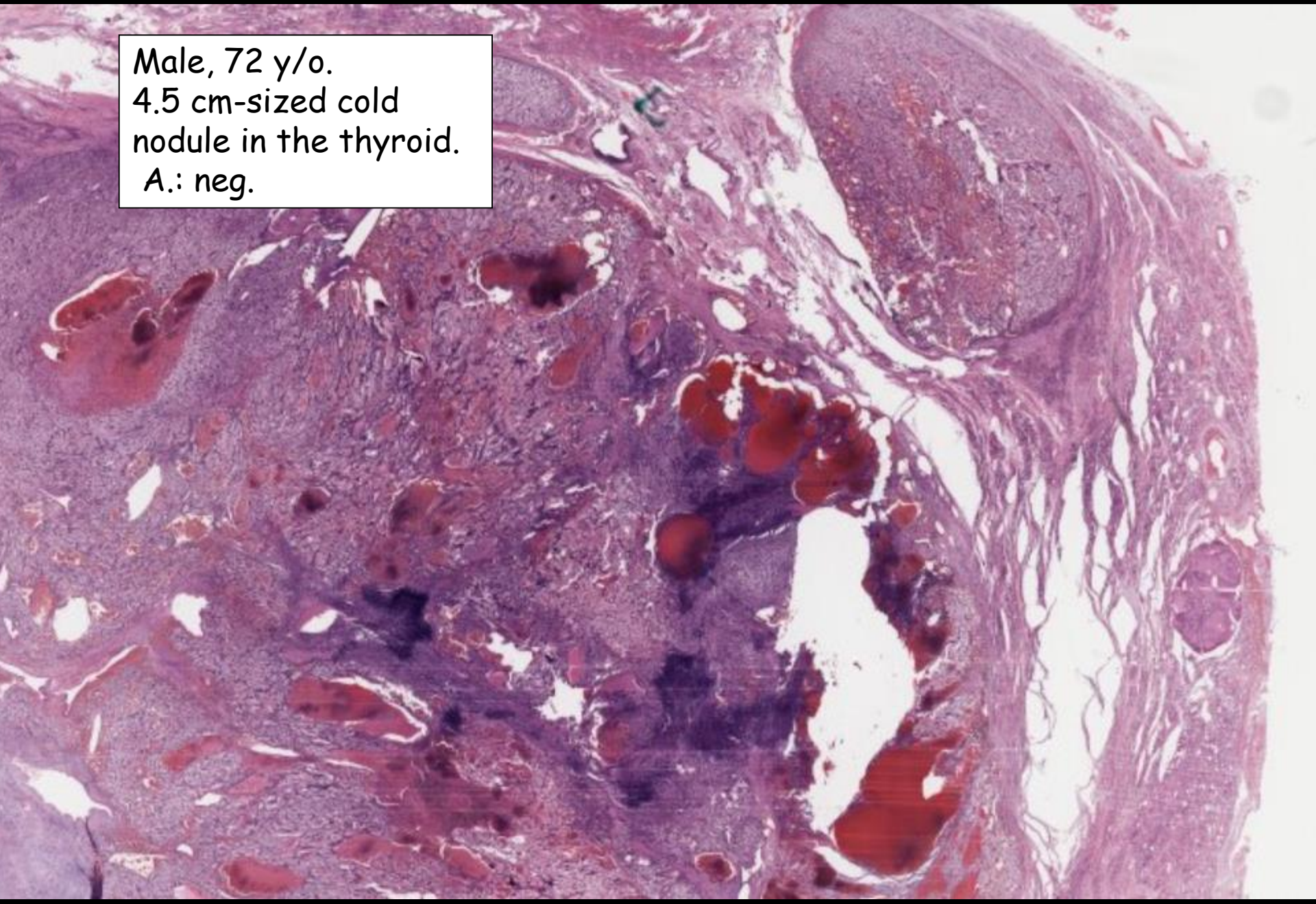


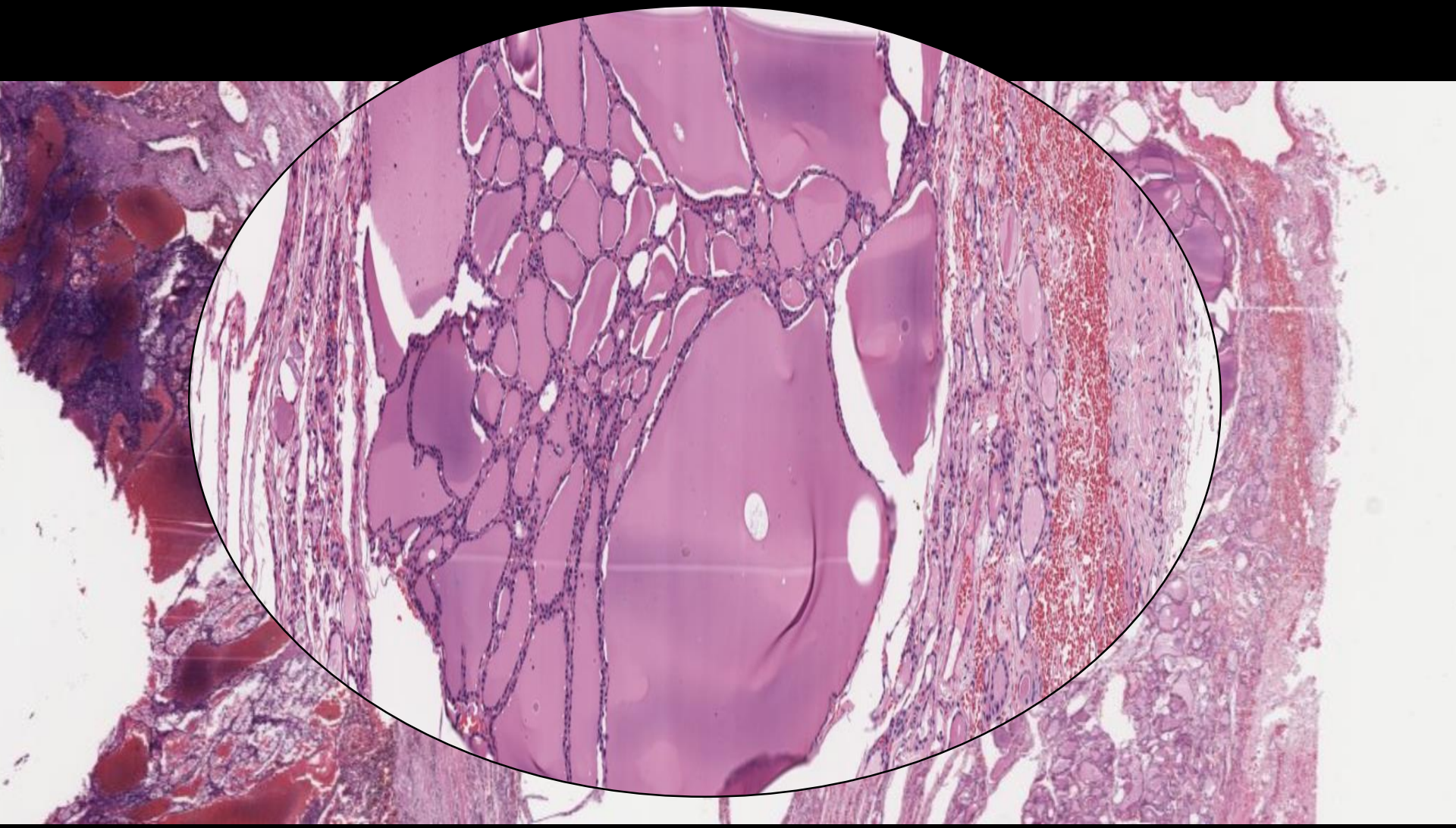


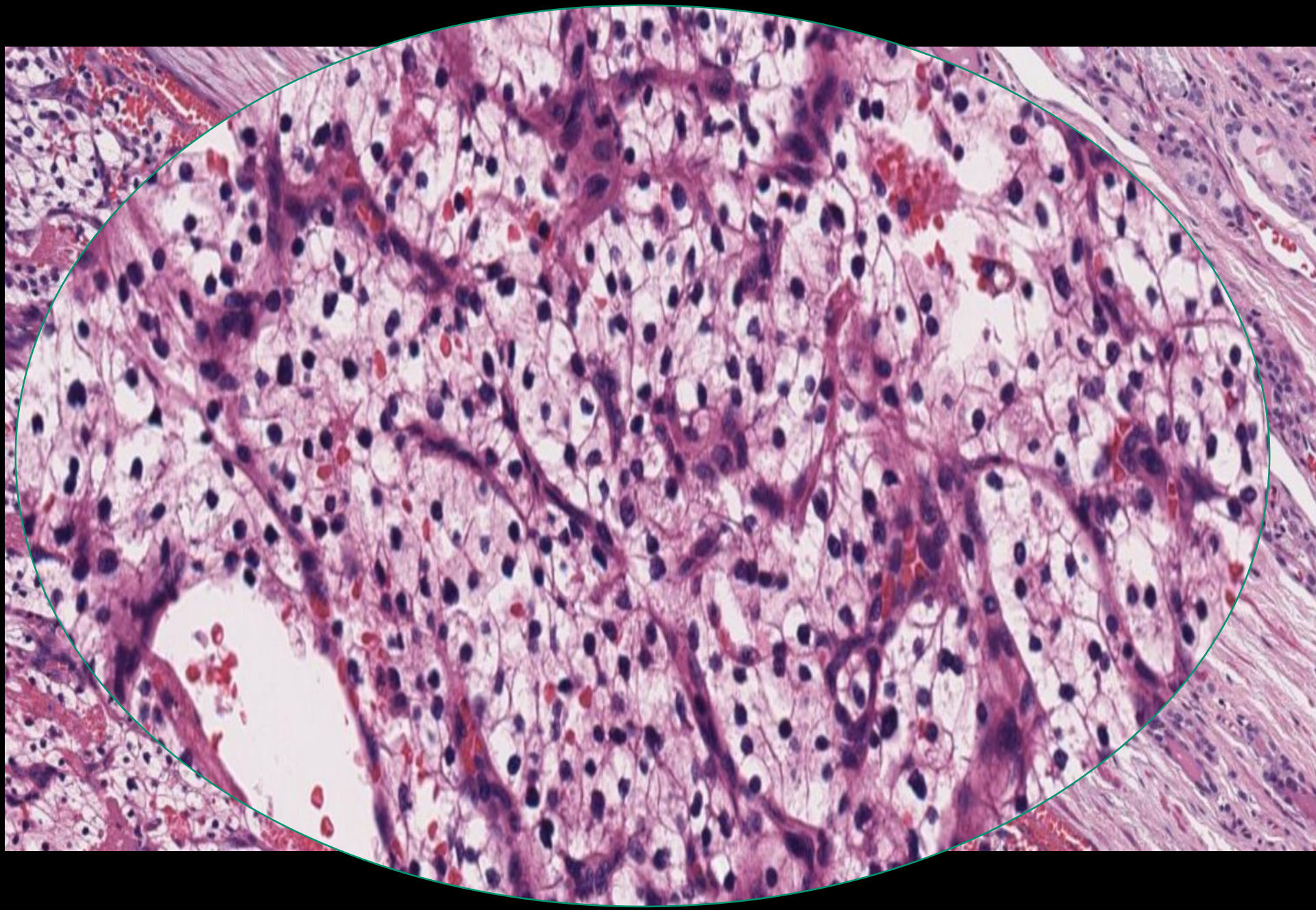


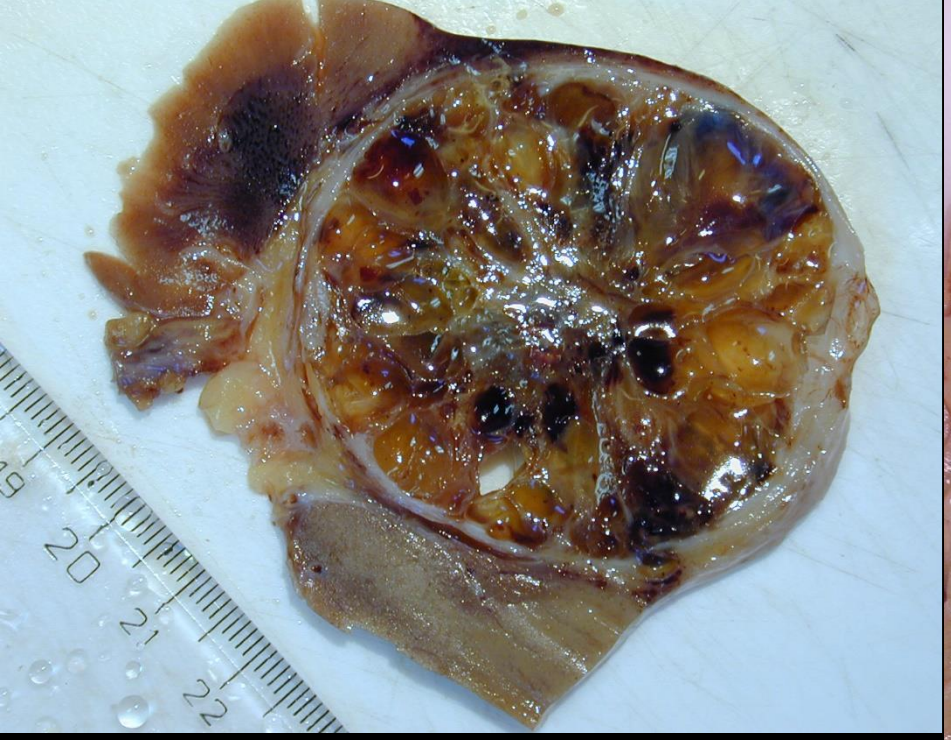
Male, 65 y/o. Pathologic fracture of the humerus. 3 weeks after polster…..




Male, 72 y/o.
4.5 cm-sized cold
nodule in the thyroid.
A.: neg.






20
21
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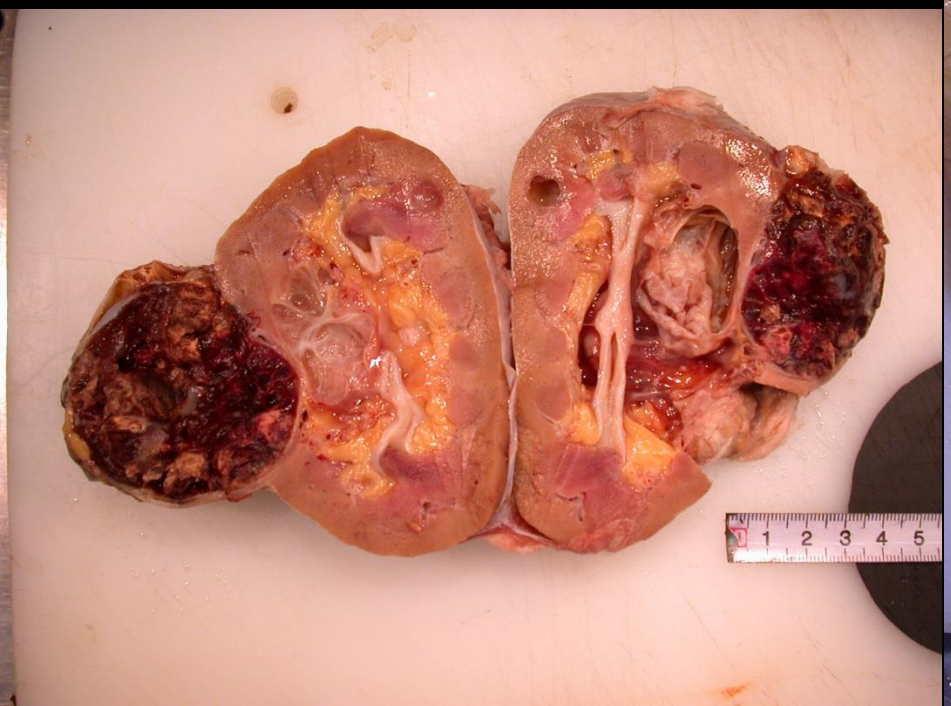
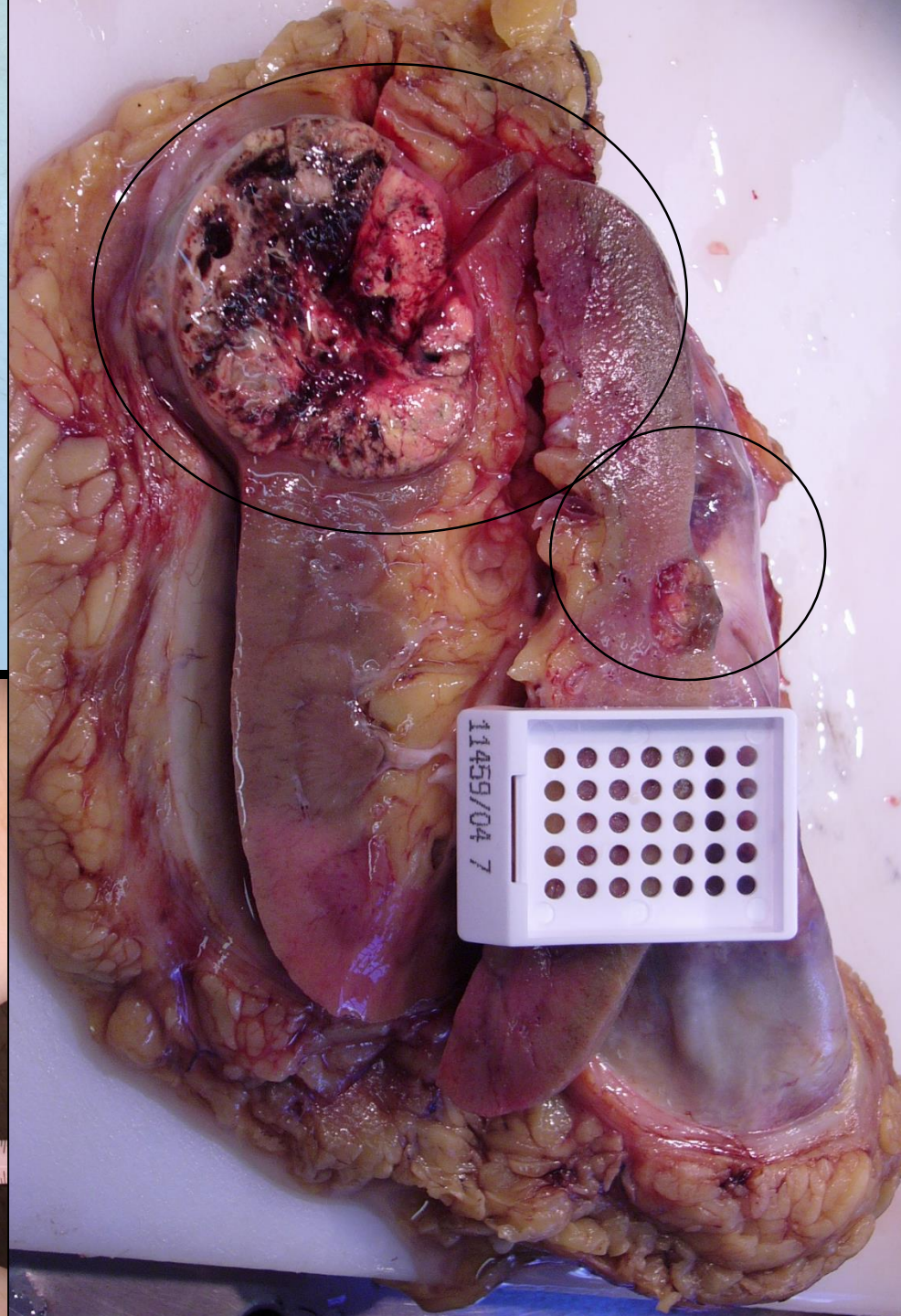
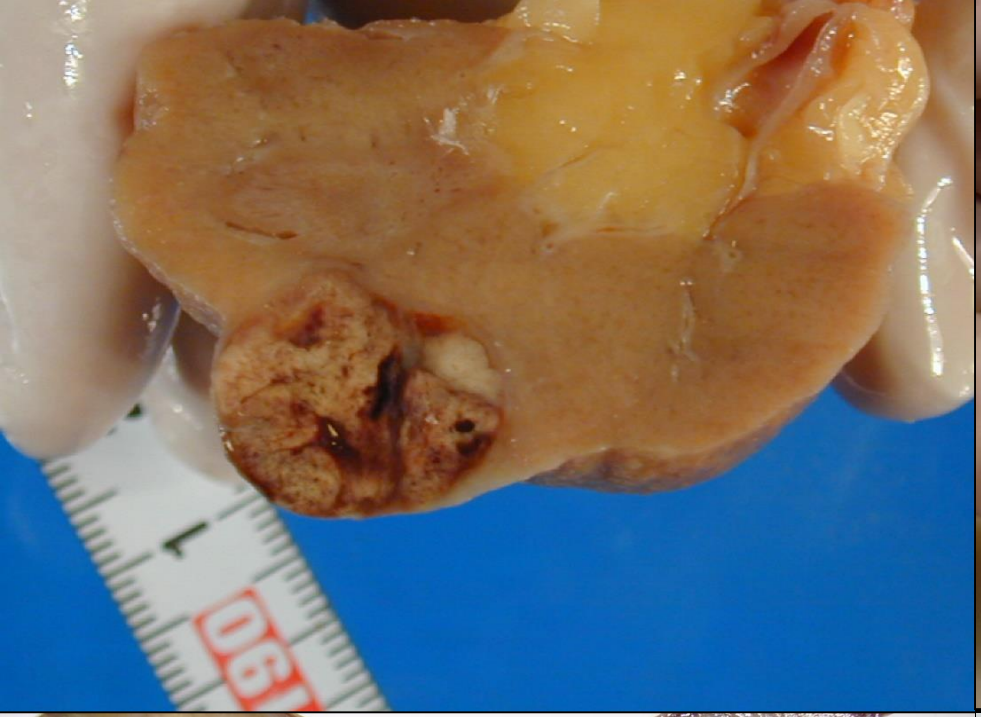
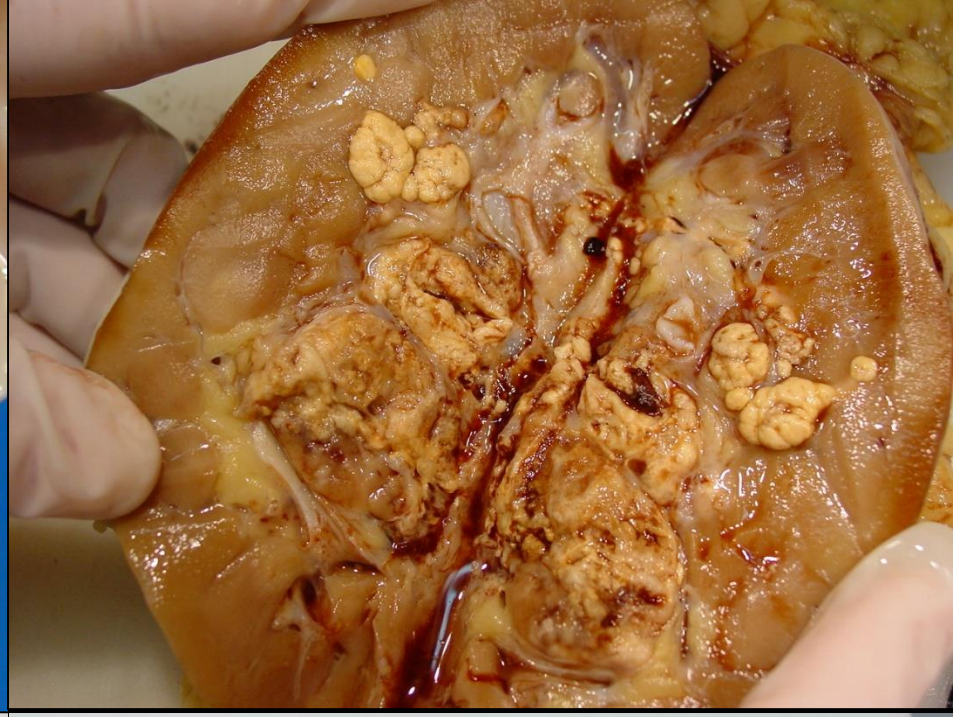
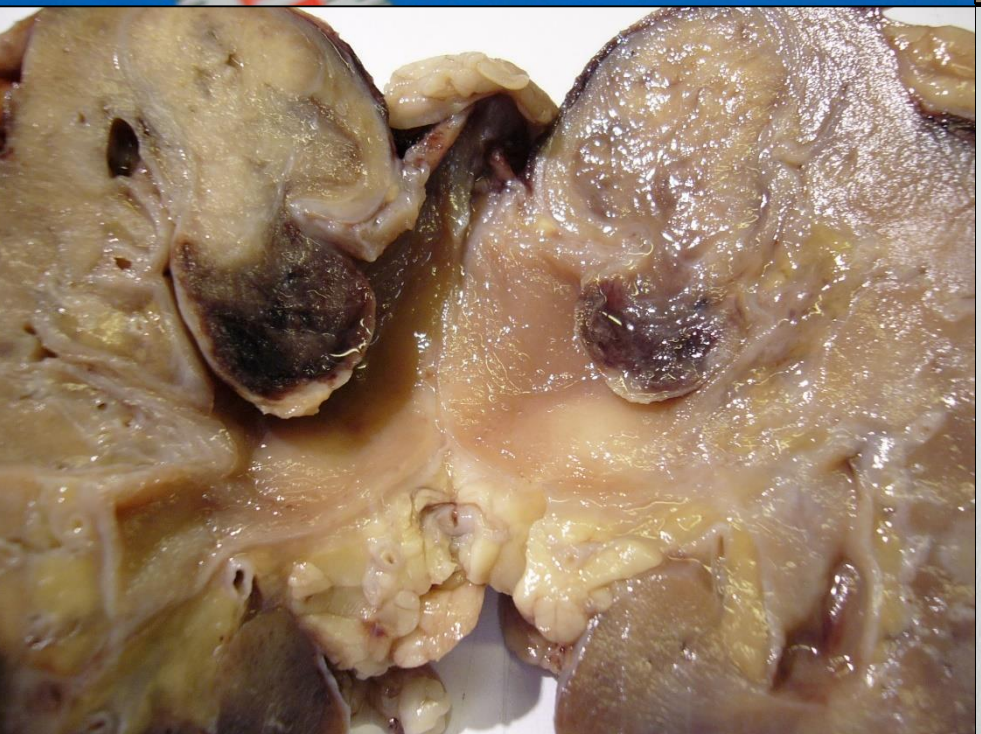
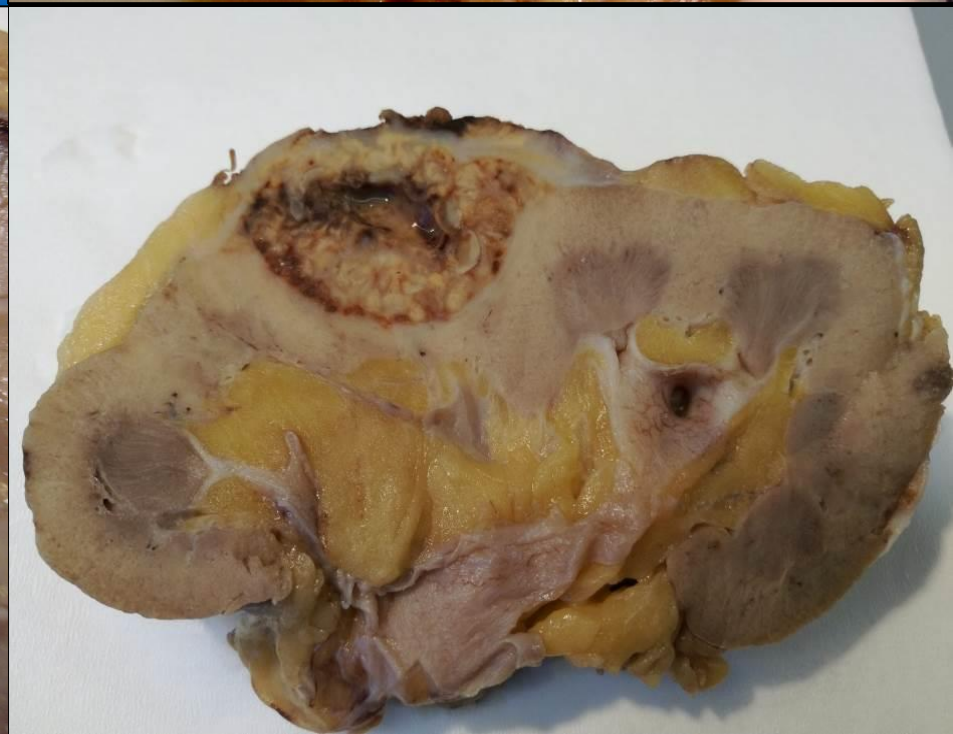

1 2 3 4 5


11459/04 7

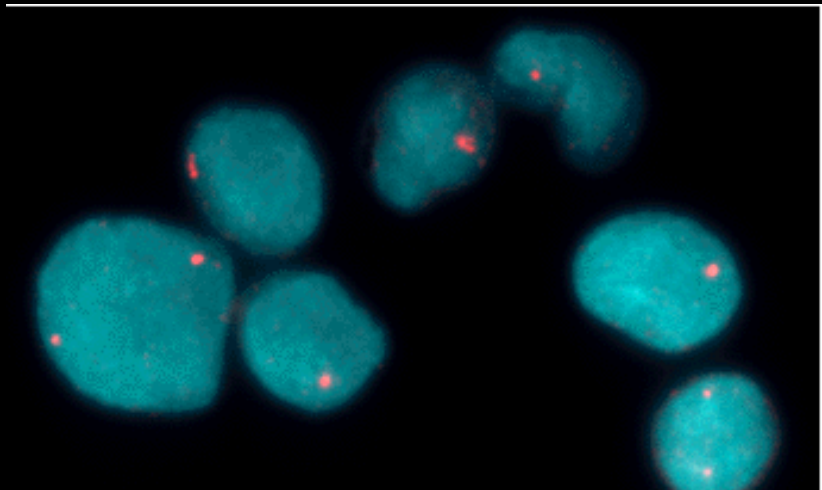





Risk factors

Enviromental effects

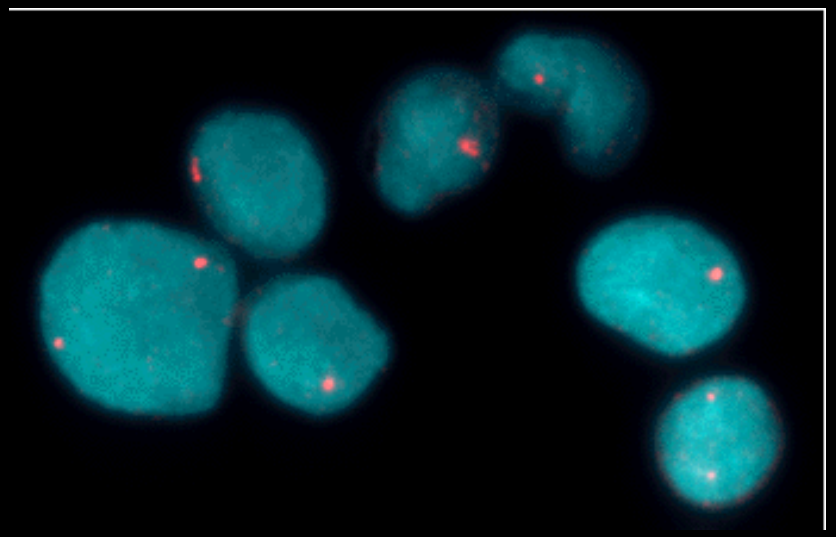
- smoking
- petrol
- painting industry
- heavy metals
- Laboratory workers
- asbestos-firemen

- obesity
- hypertension
- oestrogen therapy
- Von Hippel Lindau



Most frequent chromosomal abnormalities

Chr. Abn.:
3-3p14/3p.26 trans.,
del, VHL gene(3p25.3)
7,16,17 trisomy,
Y loss,
X;1 transl (papill. Cc.)



96% sporadic

4% familiary

- VHL
- Hereditary familiar RCC - VHL gene, without any other manifestation of VHL
- Hereditary papillary cancer

Tumors of the kidney

Histogenesis of renal tumors

Tubular epithelium	*Mesenchyme*	*Metanephrogenic elements*
Papillary adenoma	Angiomyolipoma	Metanephric adenoma
Oncocytoma		Nephroblastoma (Wilms tumor)
Clear cell renal cell carcinoma (renal cell carcinoma: RCC)		
Multilocular cystic neoplasm		
Papillary RCC		
Chromophobe RCC		
Clear cell papillary RCC		

Tumors of the kidney

Benign

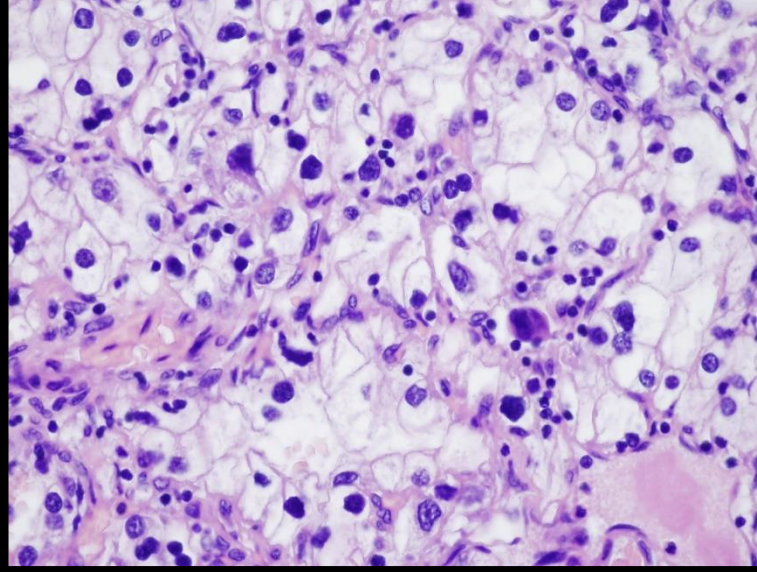
Nephrogenic adenoma
Oncocytoma
Angiomyolipoma

Malignanat
RCC
- conventional
- cystic
- papillary
- chromophob cell
- sarcomatoid

UCC
Wilms

Malignant, non RCC
- Mesenchymal
- Lymphoma, leukaemia
- Mal. angiomyolipoma
- Metastatic

VI. Tumors of the kidney



Malignant tumors

1. Clear cell RCC

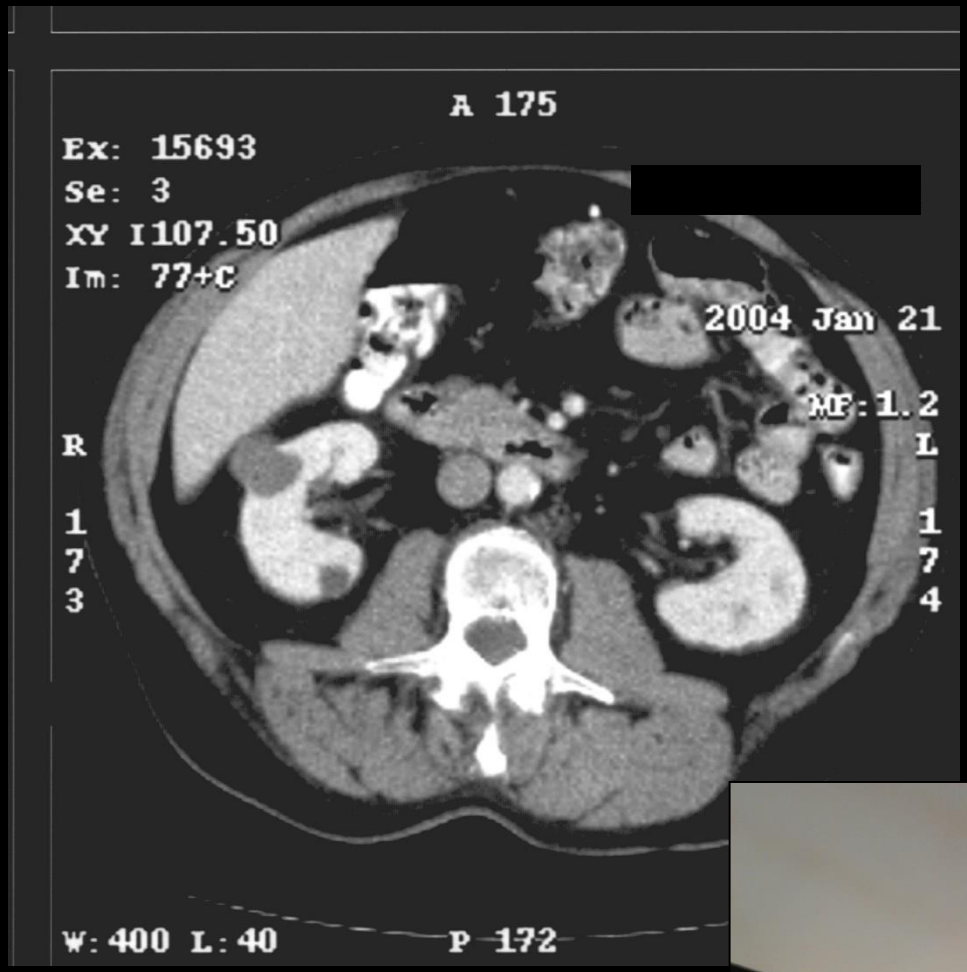
Most common type (approx. 80%)

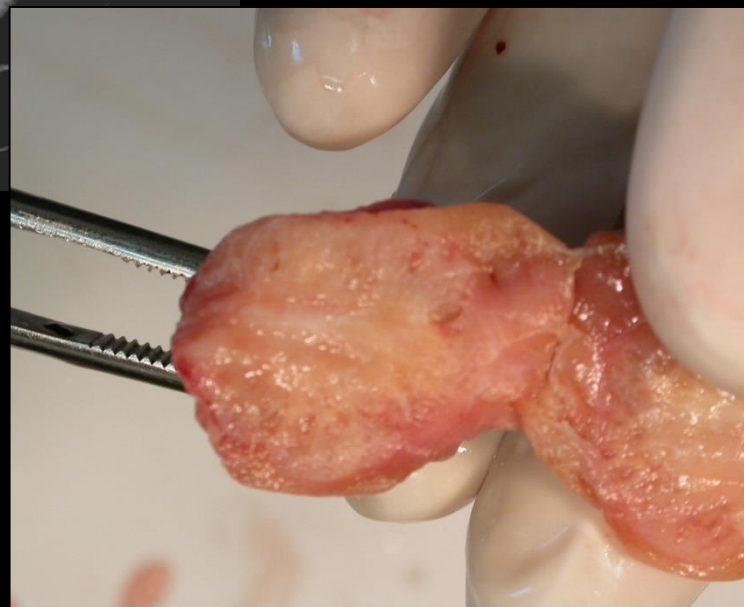
Characteristic golden yellow color

Variable architecture: solid, tubular, papillary, microcystic, cystic

Haemorrhages and necroses are usual

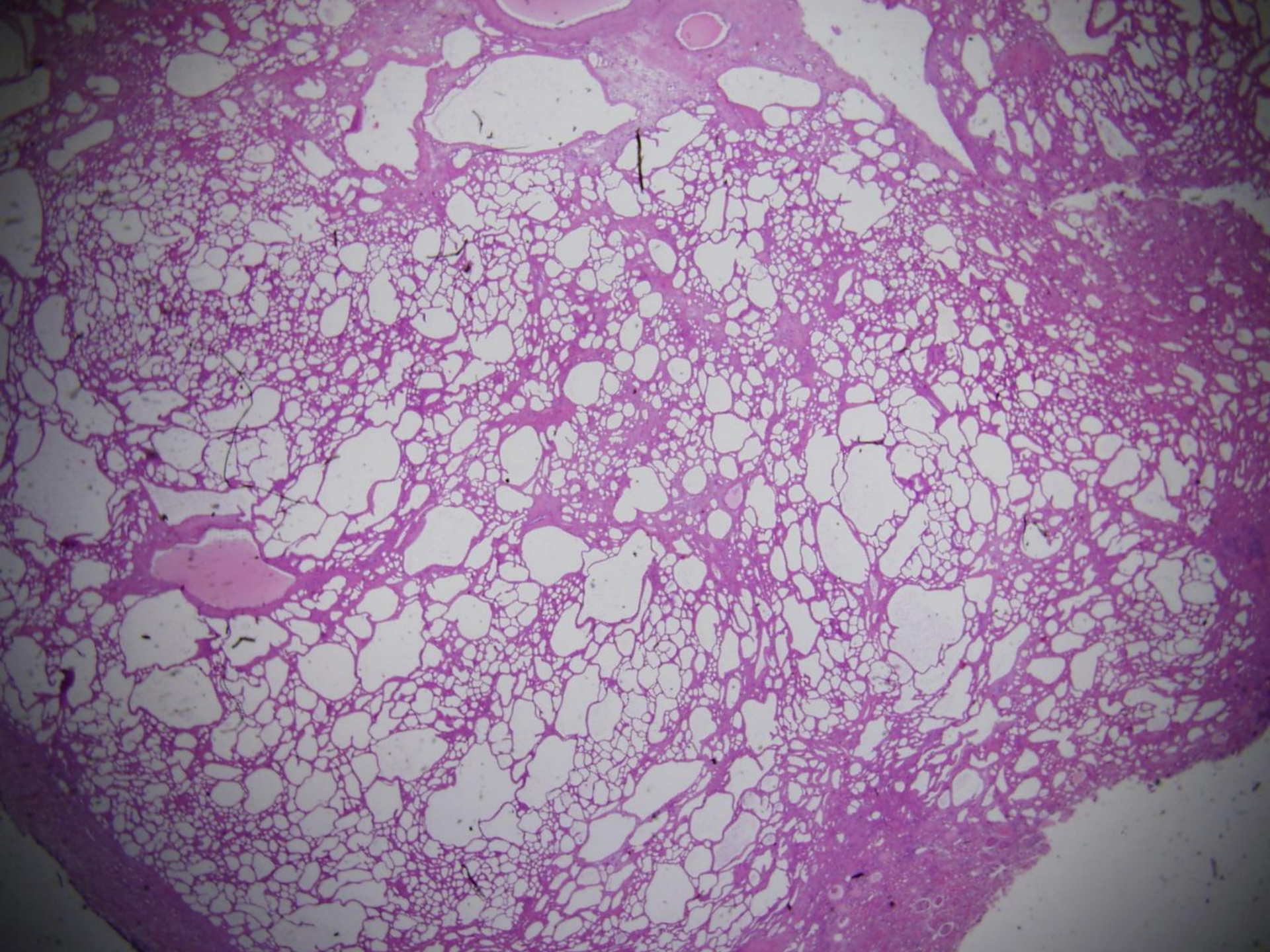
Genetic/epigenetic alteration: 3p deletion, VHL mutation, VHL hypermetilation

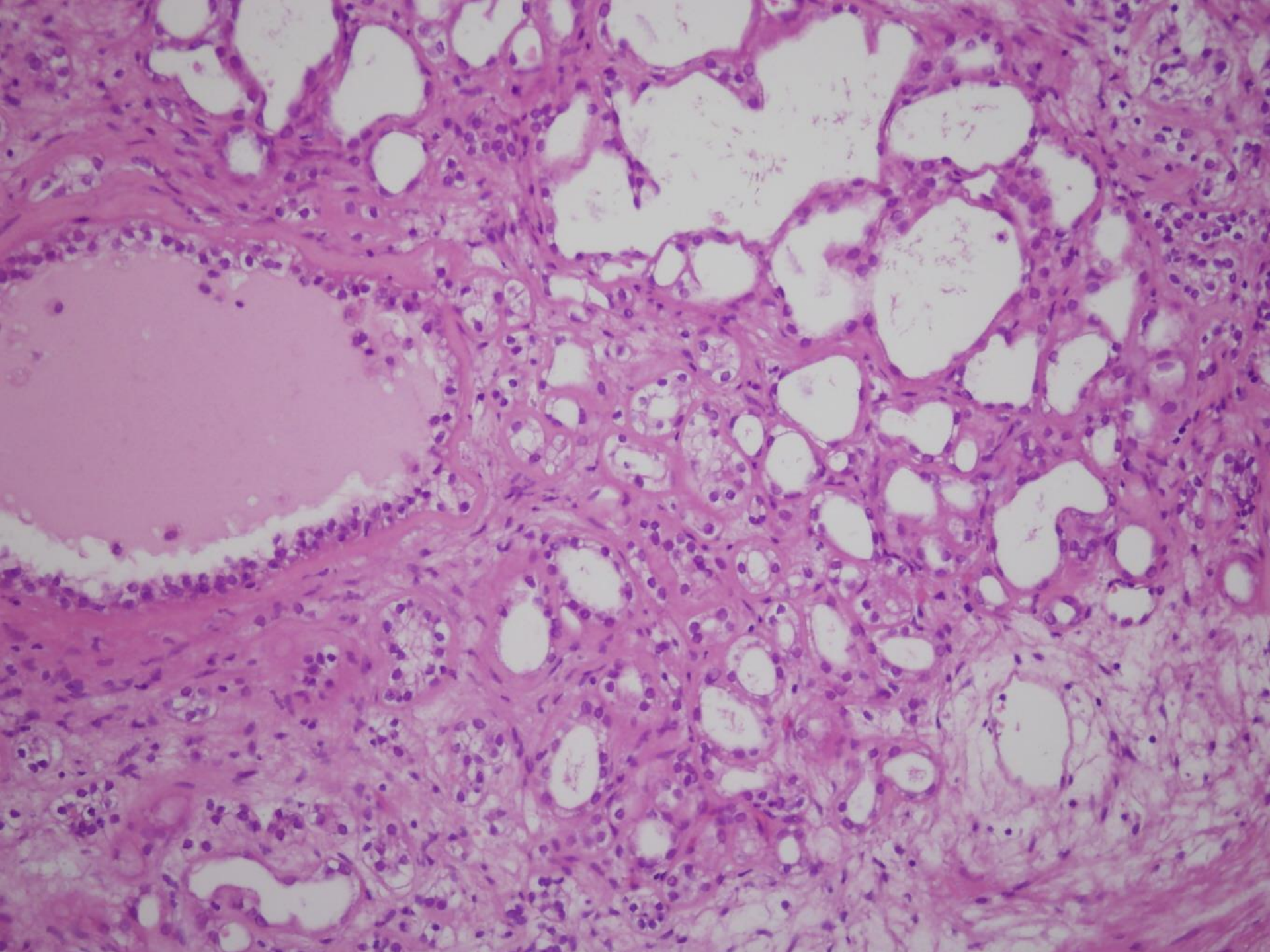

A 175
Ex: 15693
Se: 3
XY I107.50
Im: 77+C
2004 Jan 21
MF:1.2
R
L
1
7
3
1
7
4
W:400 L:40
P 172

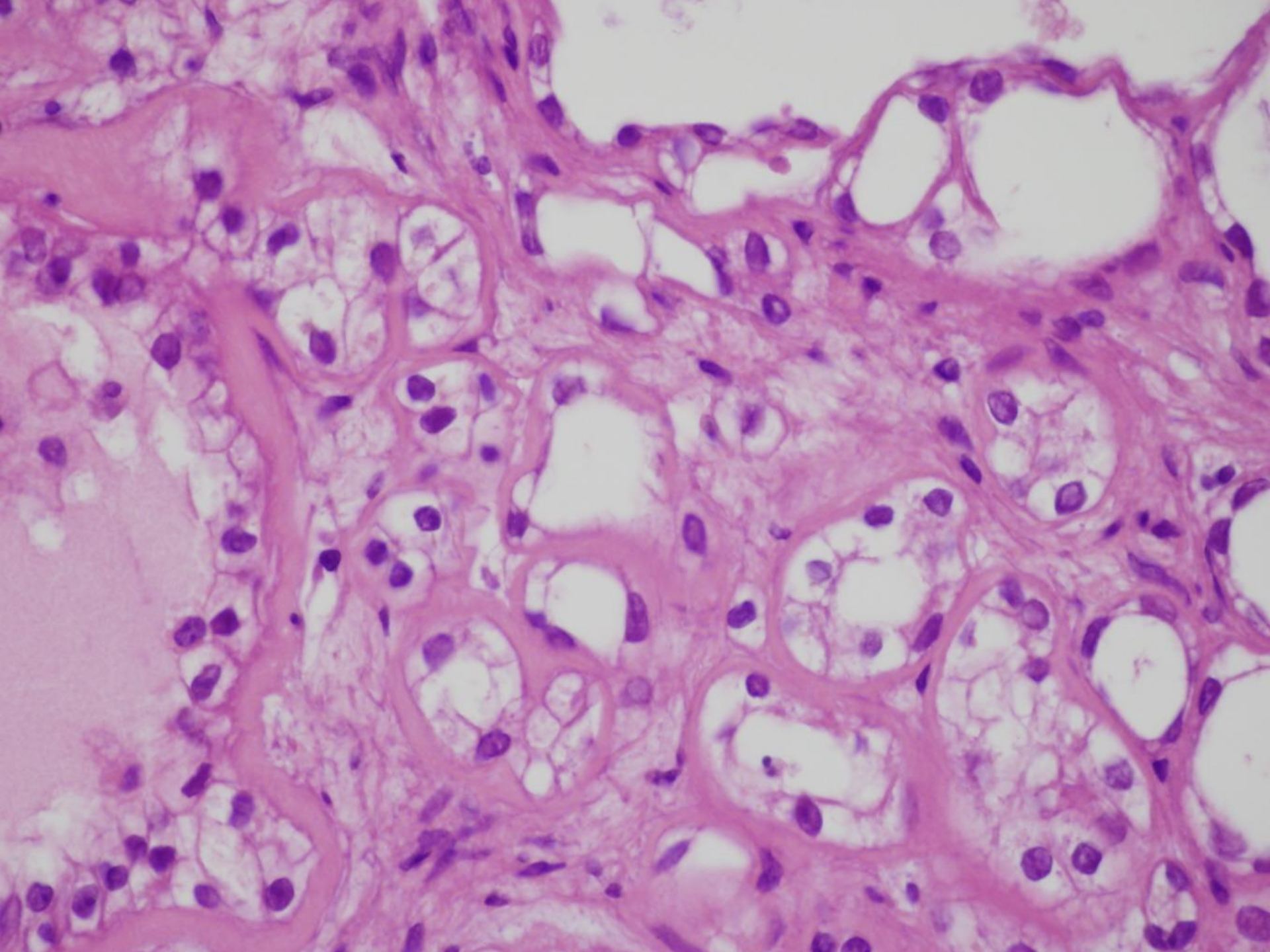


N. L. cyst?

RCC ?







Malignant tumors

Multilocular cystic renal neoplasm of low malignant potential

2-3% of RCCs

Middle-aged patients, usually incidentally detected

Complex cystic lesion by radiological examination

Composed exclusively of thin-walled cysts

Clear cyst content

Low-grade tumor cells: internal surface of cysts, small groups in the septums

Excellent prognosis

Papillary RCC

Second most common (approx. 12-15%)

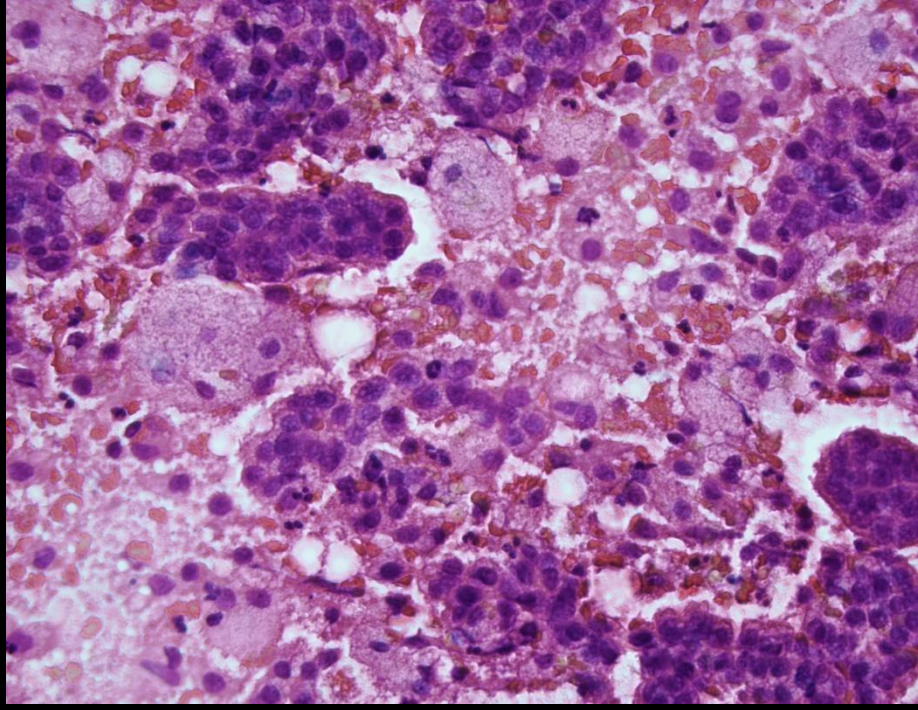
More commonly multifocal

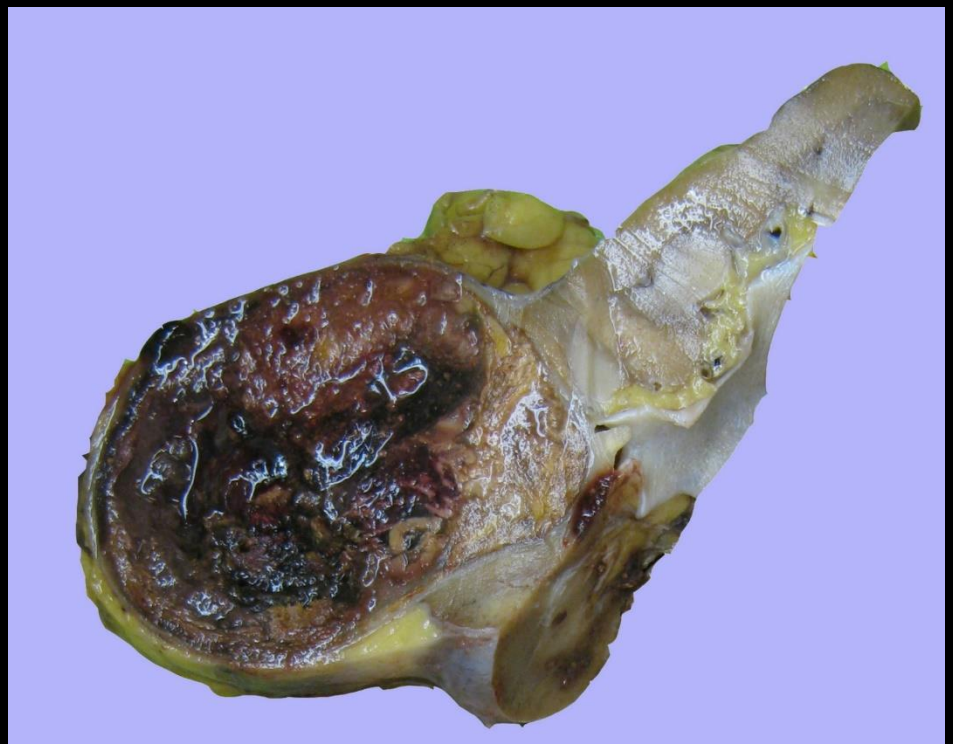
Type 1

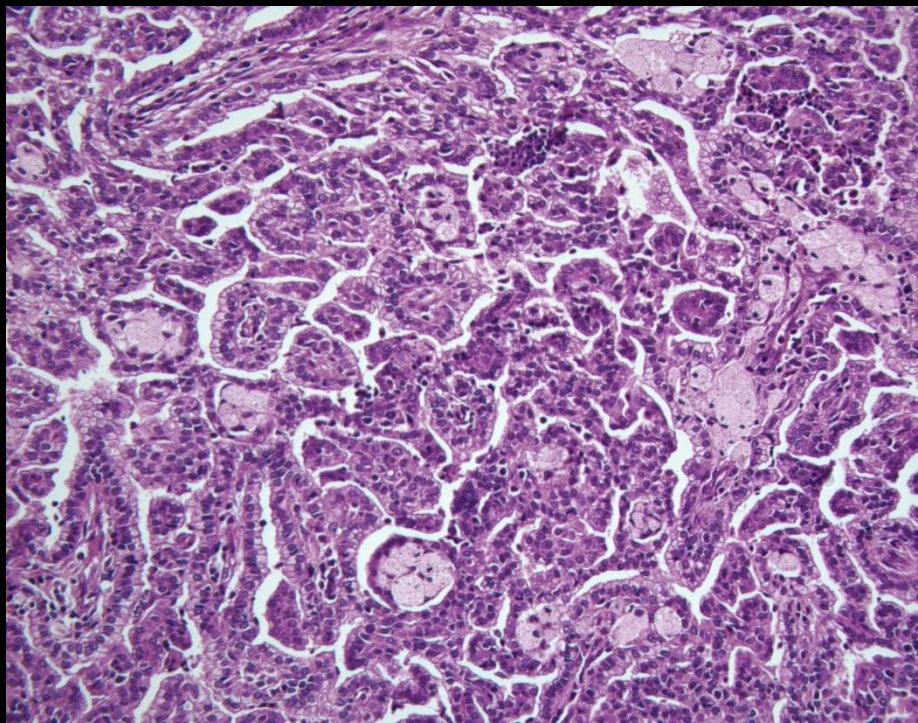
Grey-white, well-circumscribed, encapsulated, haemorrhages

Papillary, tubular, or solid architecture

Cuboidal cells, foamy macrophages, psammoma bodies







Papillary RCC

Second most common (approx. 12-15%)

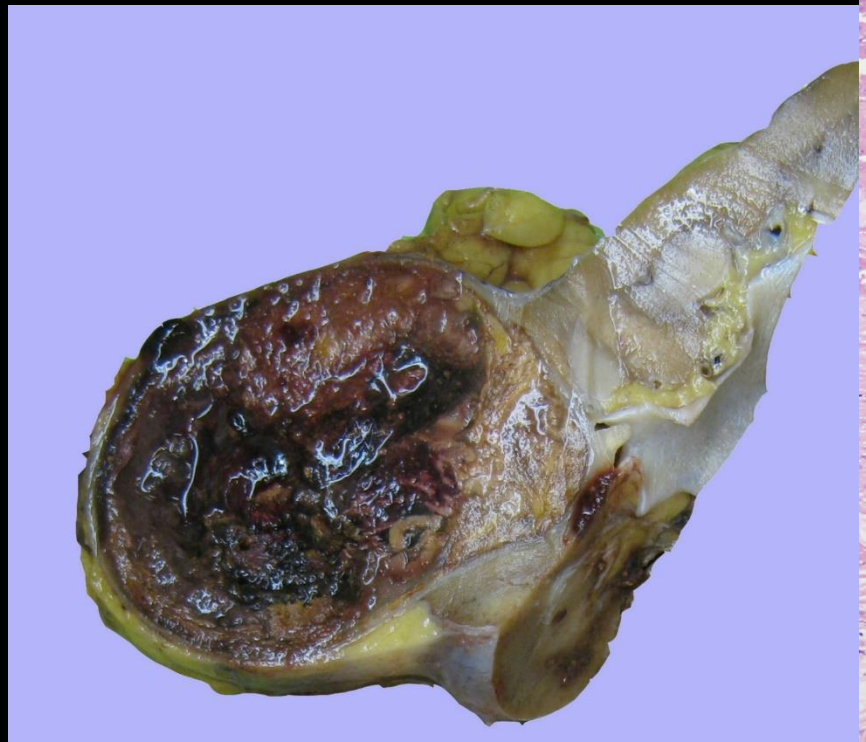
More commonly multifocal

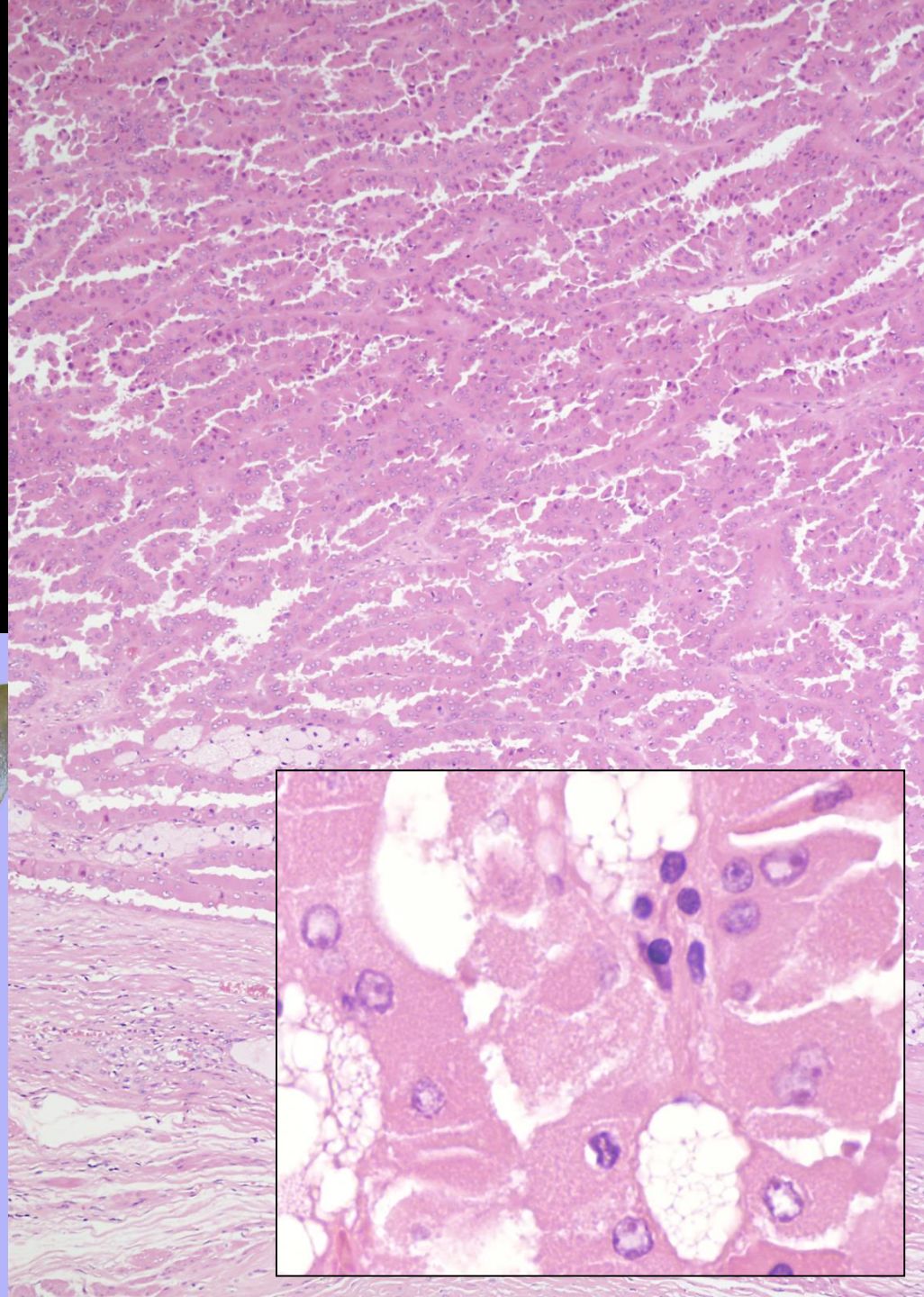
Type 2

Variable appearance, necroses, haemorrhages

Larger cells, higher grade, worse prognosis

Characteristic genetic alteration: trisomies (**7**, **17**, 12, 16 20), loss of Y, c-Met mutation





Chromophobe RCC

Approx. 4-5%

Well-circumscribed, grey-white

Clear or eosinophilic cytoplasm,

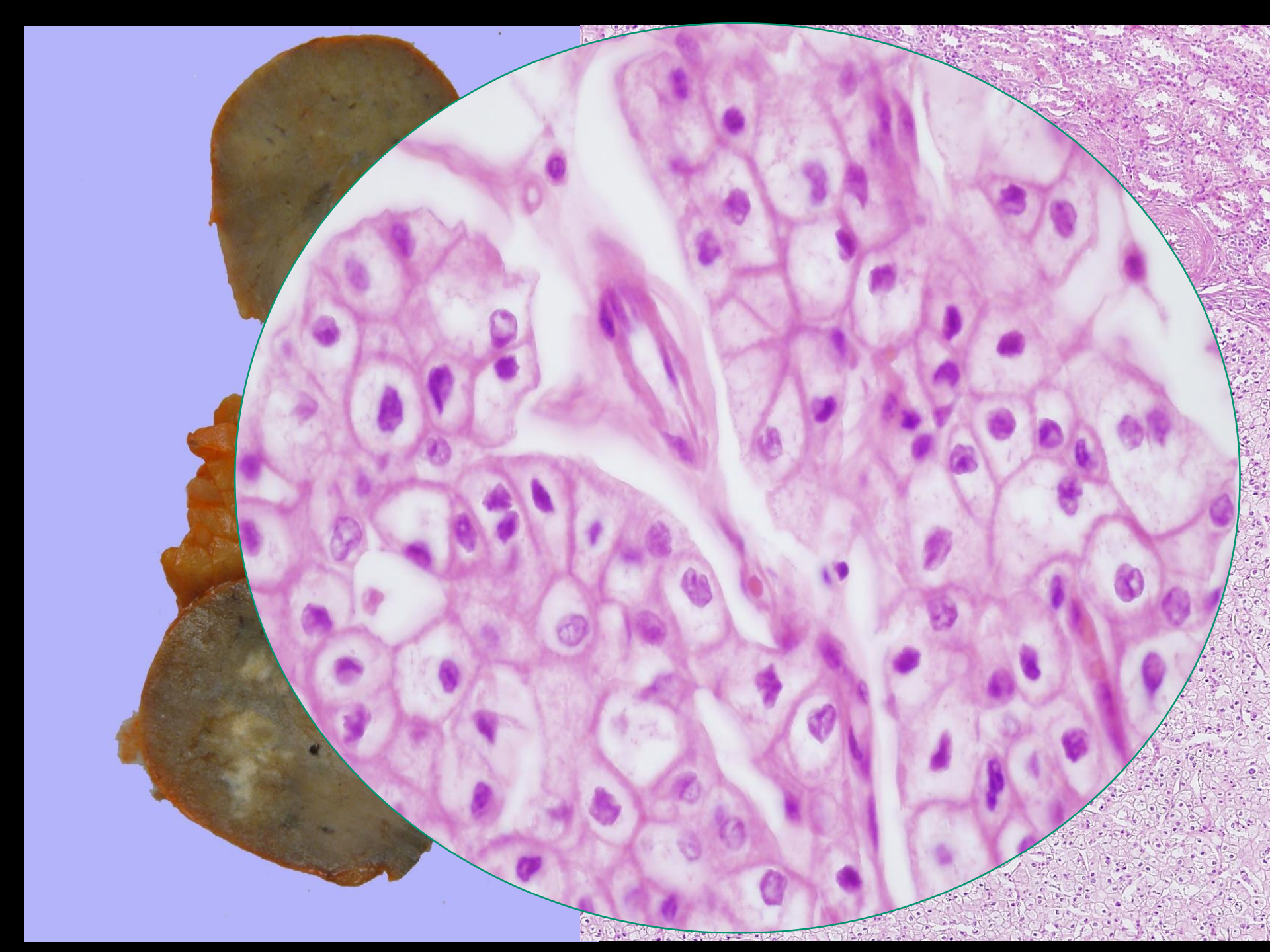
distinct cell borders, binucleated figures,

rasinoid nuclei, perinuclear halo

Widespread chromosomal losses

Better prognosis

DD: oncocytoma



Benign tumors

Benign tumors

1. Papillary adenoma

Papillary tumor with low-grade tumors cells, ≤ 15 mm

Grey-white, round nodule, can be multifocal

Commonly incidental finding

Cuboidal, monomorphic tumor cells, papillary architecture, psammoma bodies

Oncocytoma

5% of renal tumors

Machagony brown,

characteristic central scar

Nested, trabecular

architecture, degenerative signs

Oncocytic, bland looking cells

(large, granular eosinophilic

cytoplasm), however, bizarre

nuclei, extracapsular

infiltration, vascular invasion

might be encountered

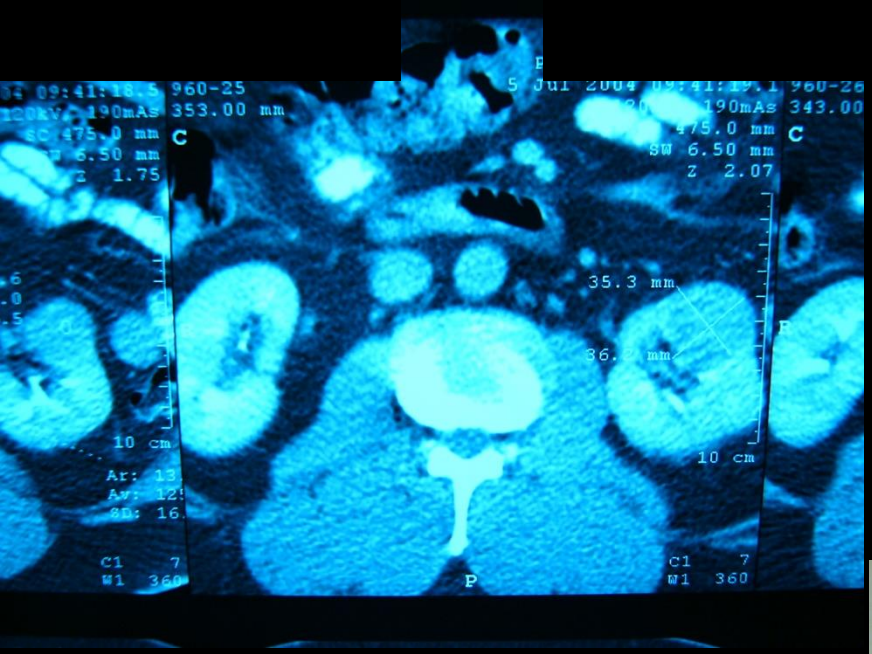
Oncocytoma

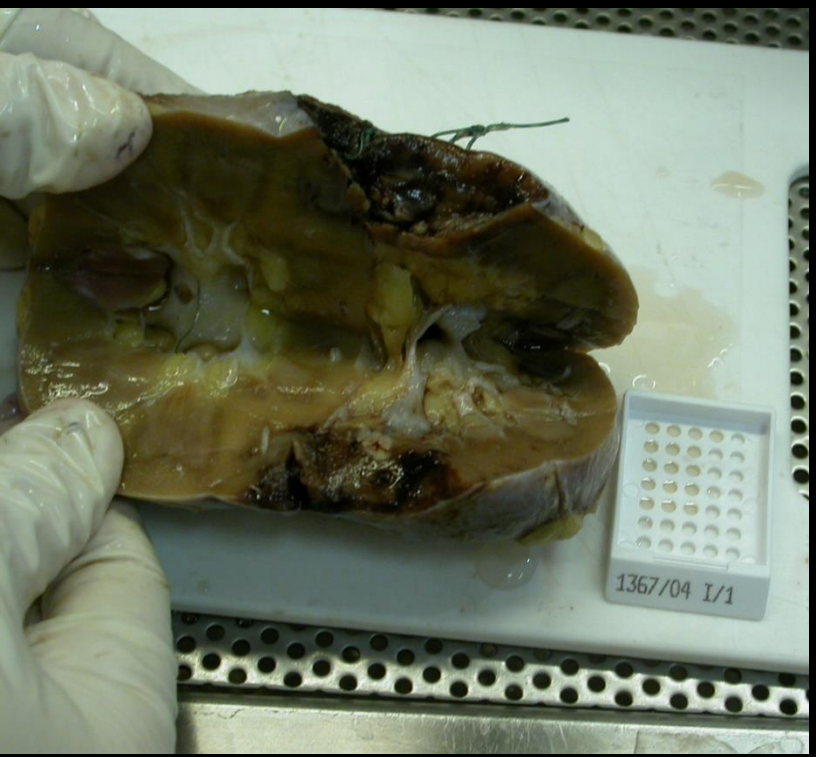
5% of renal tumors

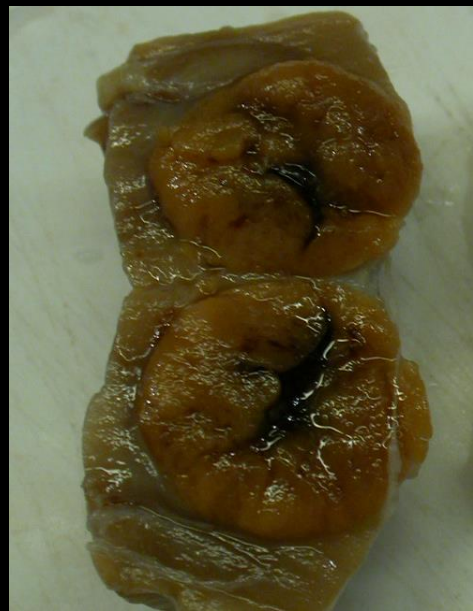
Machagony brown, characteristic central scar

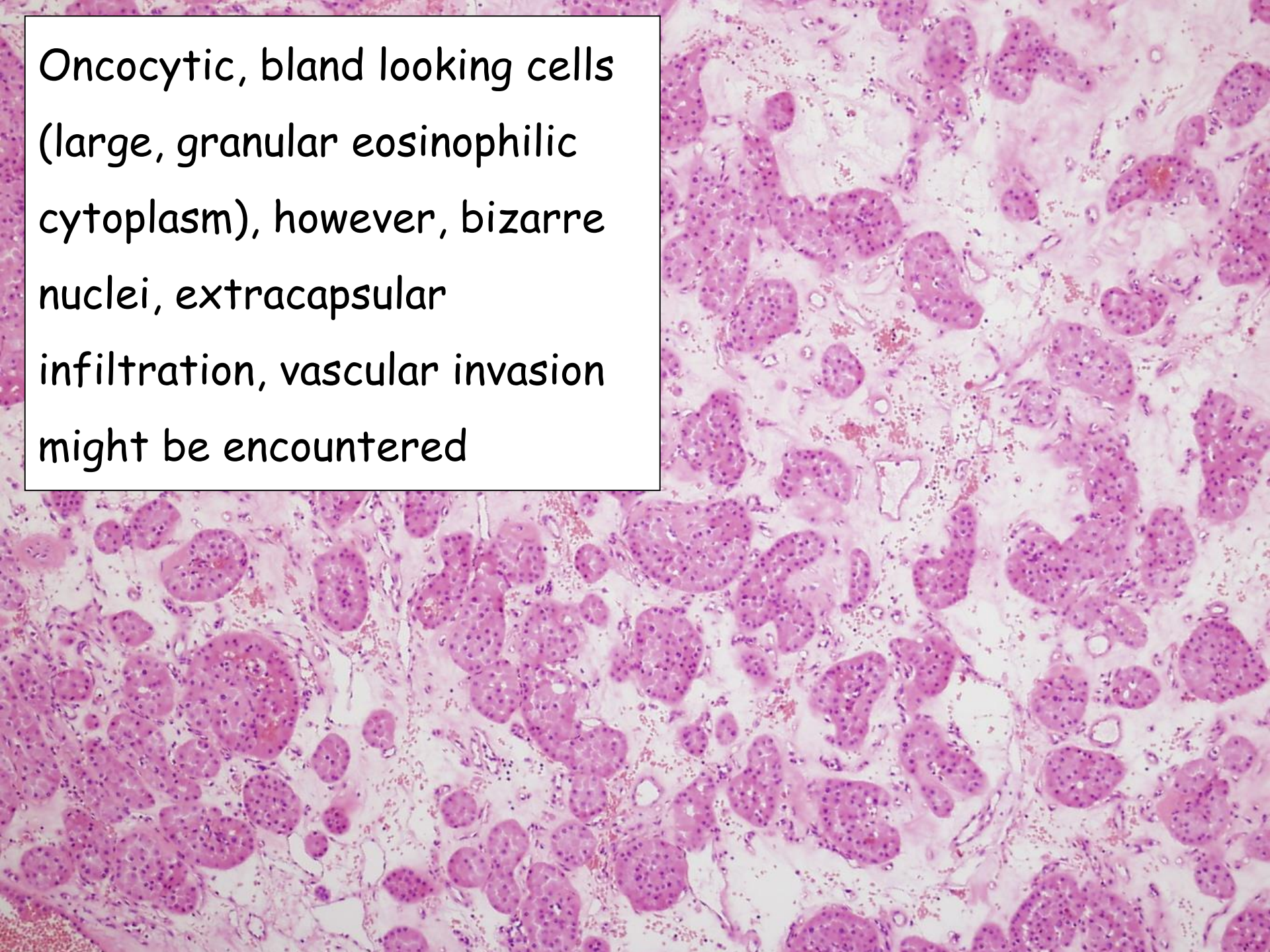
Nested, trabecular architecture,

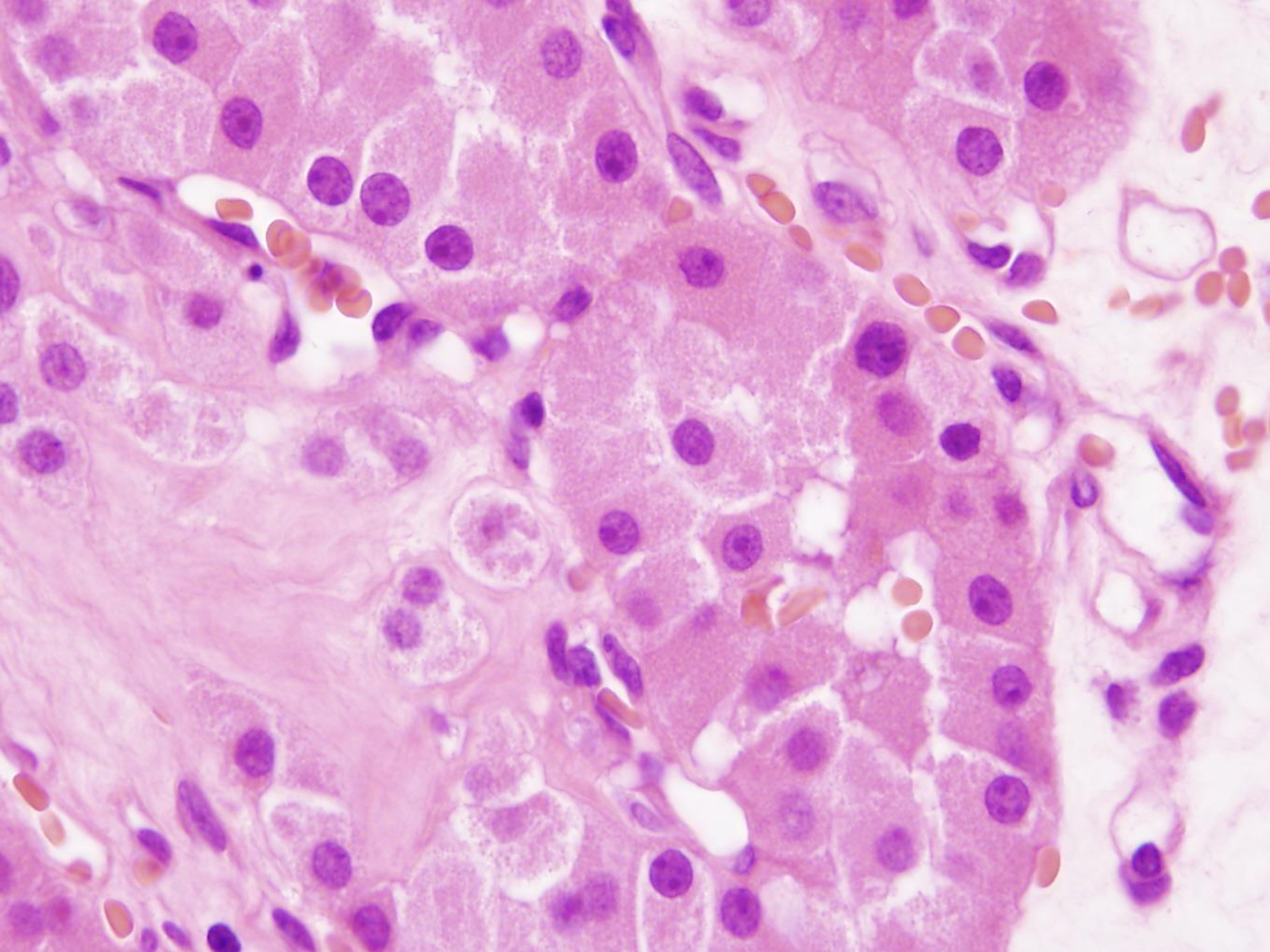
degenerative signs








Oncocytic, bland looking cells (large, granular eosinophilic cytoplasm), however, bizarre nuclei, extracapsular infiltration, vascular invasion might be encountered



Angiomyolipoma

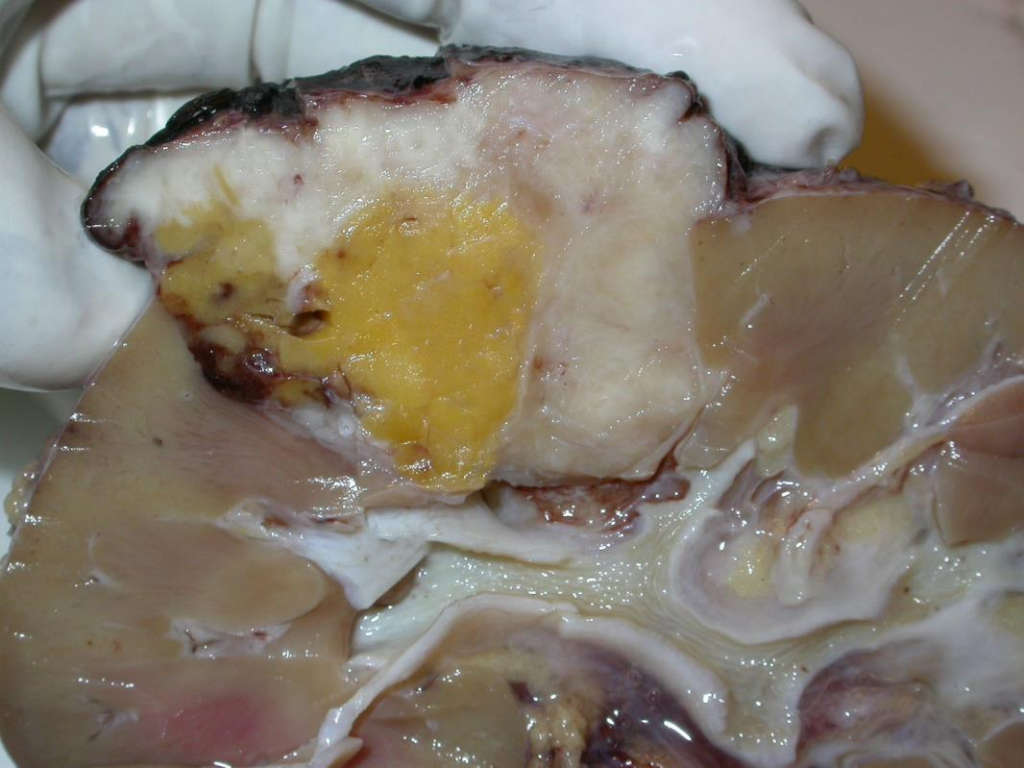
PEComa: *perivascular epithelioid cell tumor*

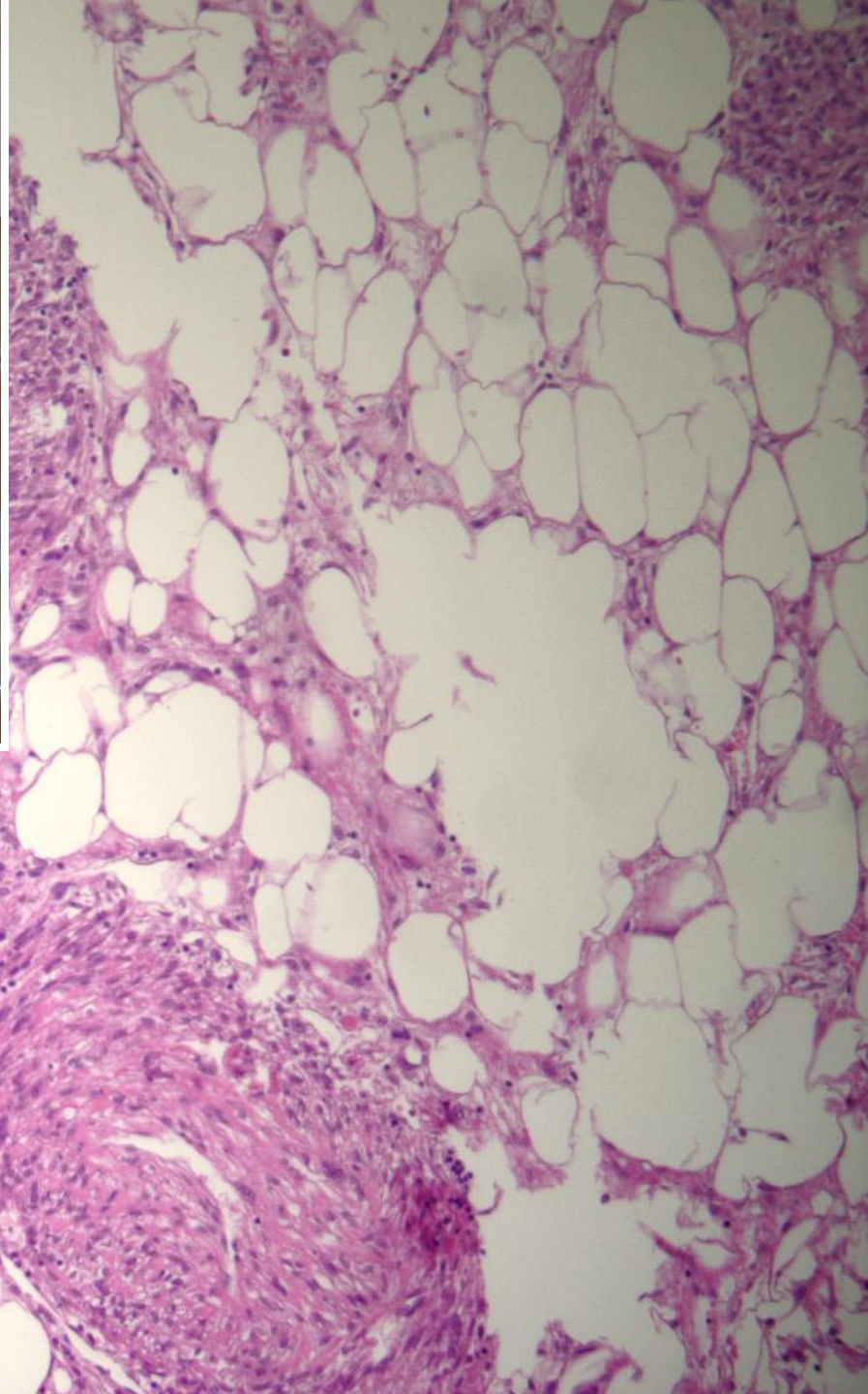
1% of the resected renal tumors, but it is more common (by US detected tumors that are not operated)

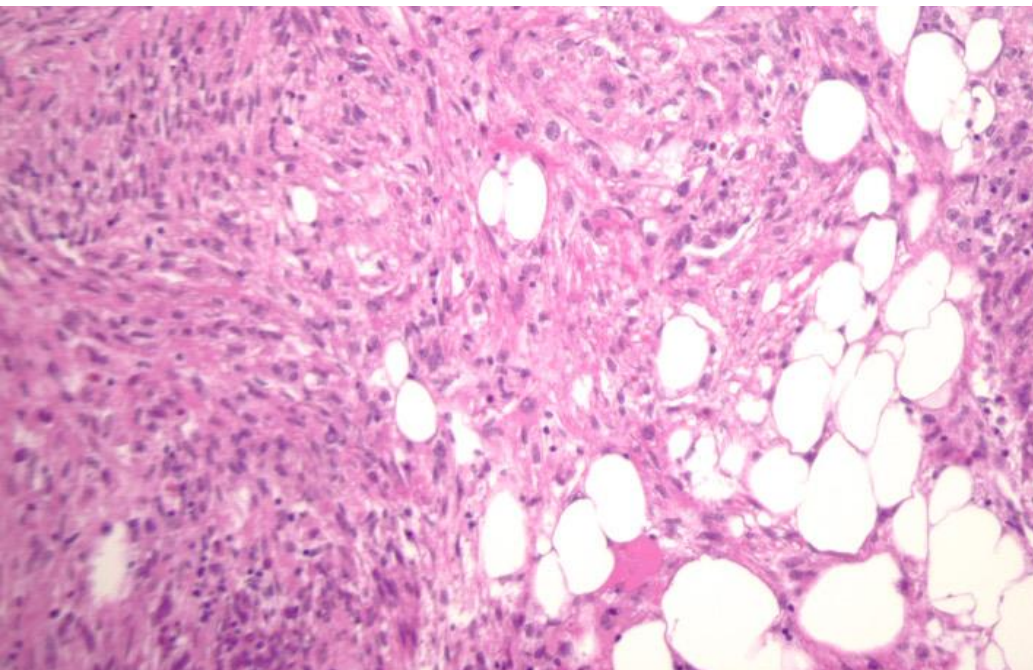
Well-circumscribed, usually fatty appearance

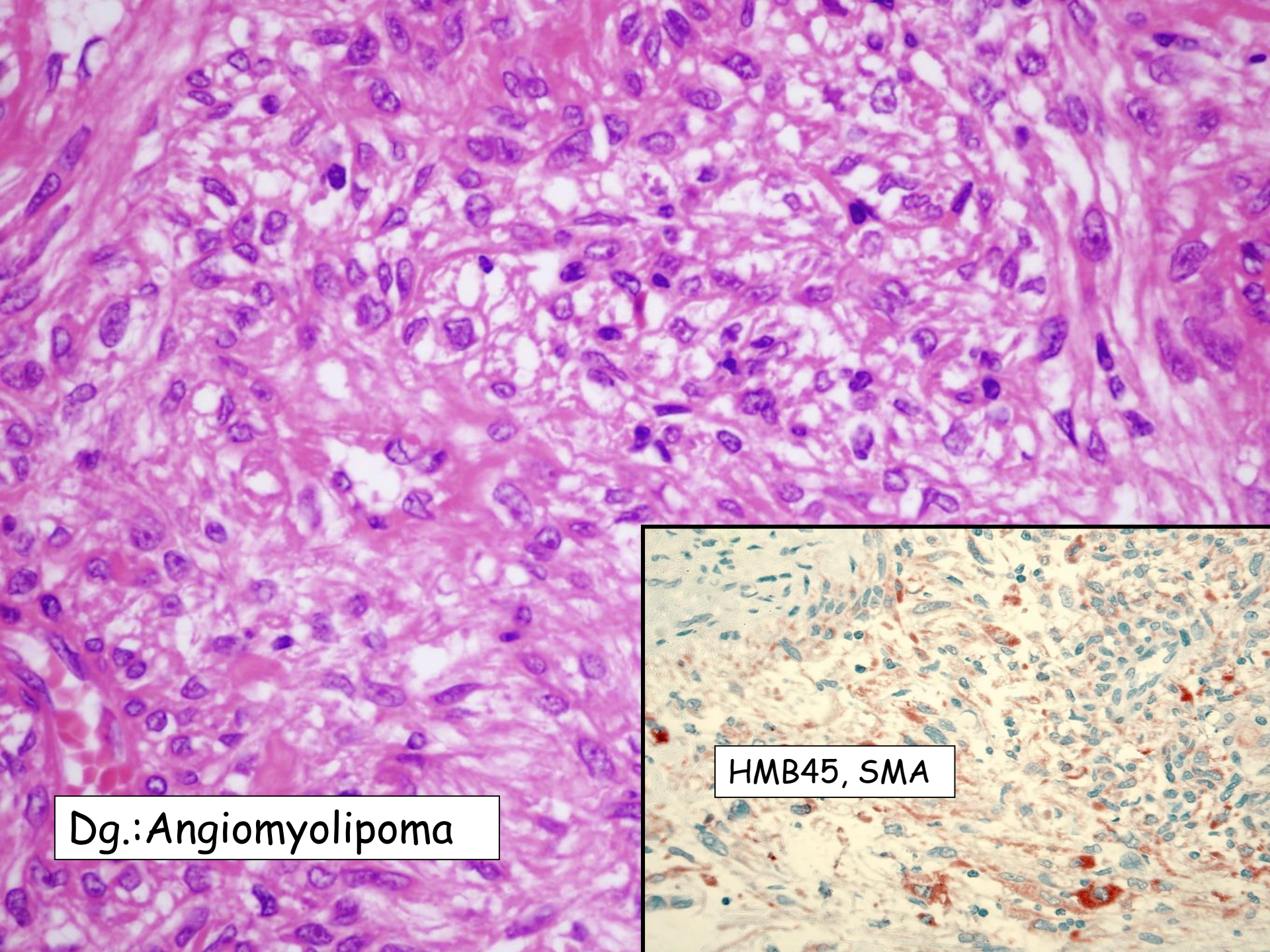
Adipose tissue, thick-walled vessels, smooth muscle

HMB45+, Melan A+ (melanocytic markers!!)








Dg.:Angiomyolipoma
HMB45, SMA

Metanephric adenoma

More common in females

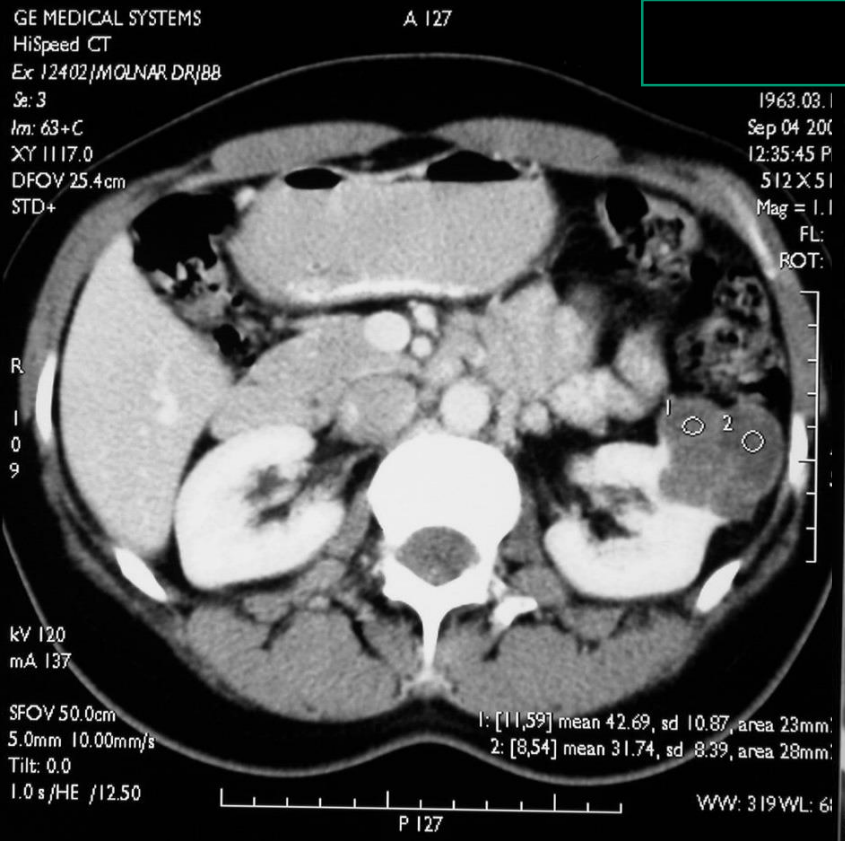
Average size is 5 cm

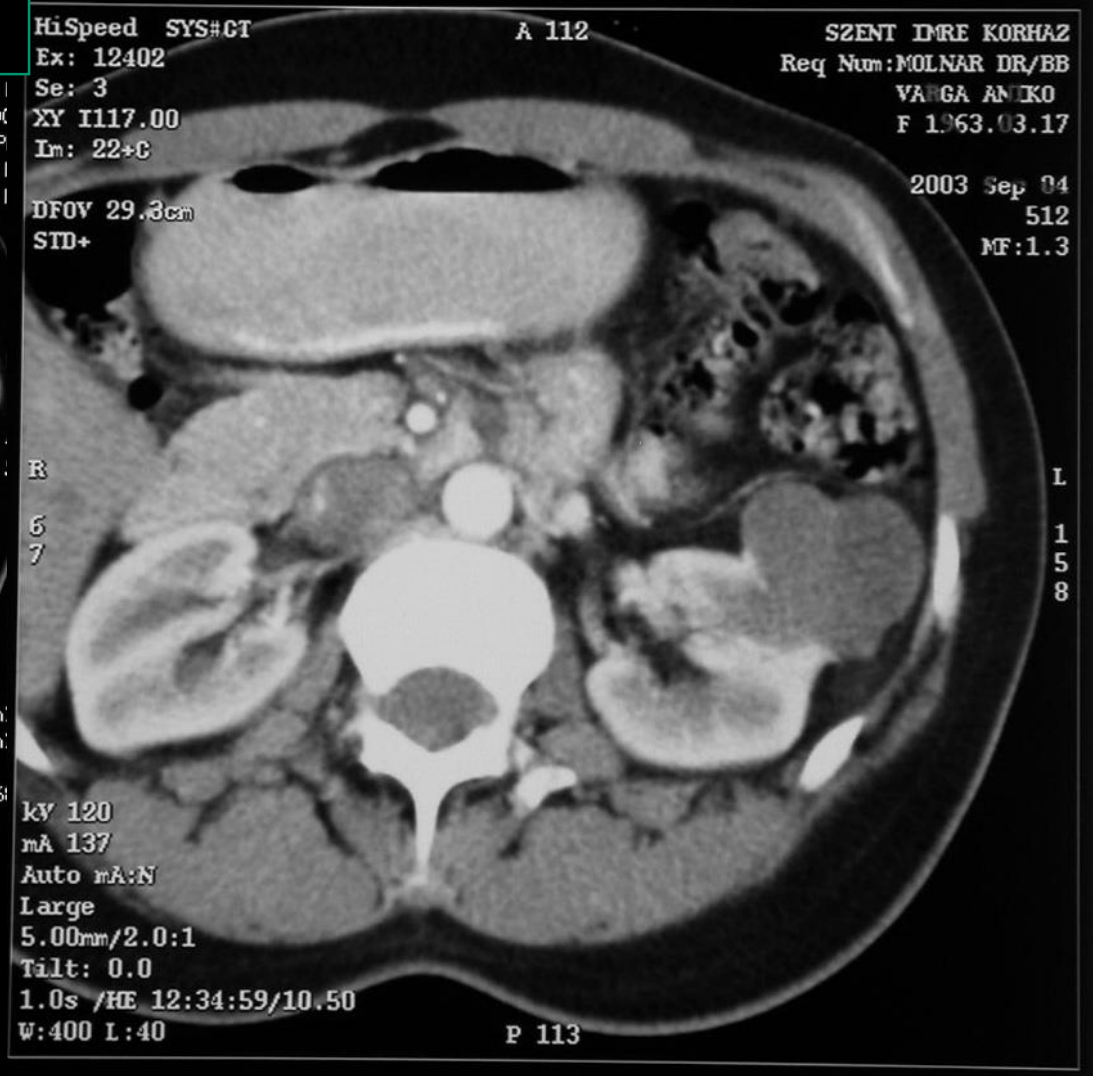
Grey-brown, solid, cystic degeneration may be present

Well-circumscribed

Tubulary, solid, or papillary architecture

No mitoses

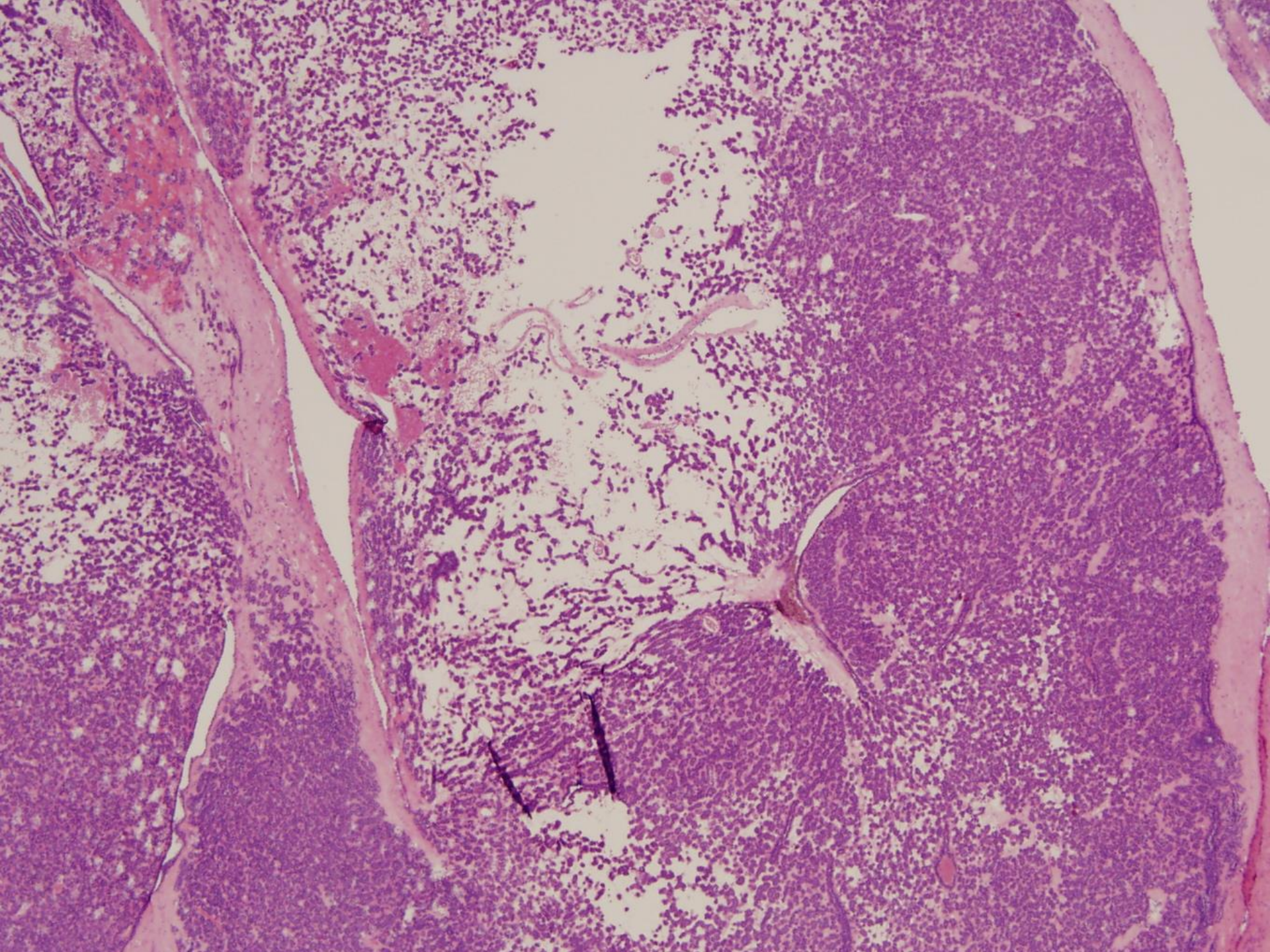


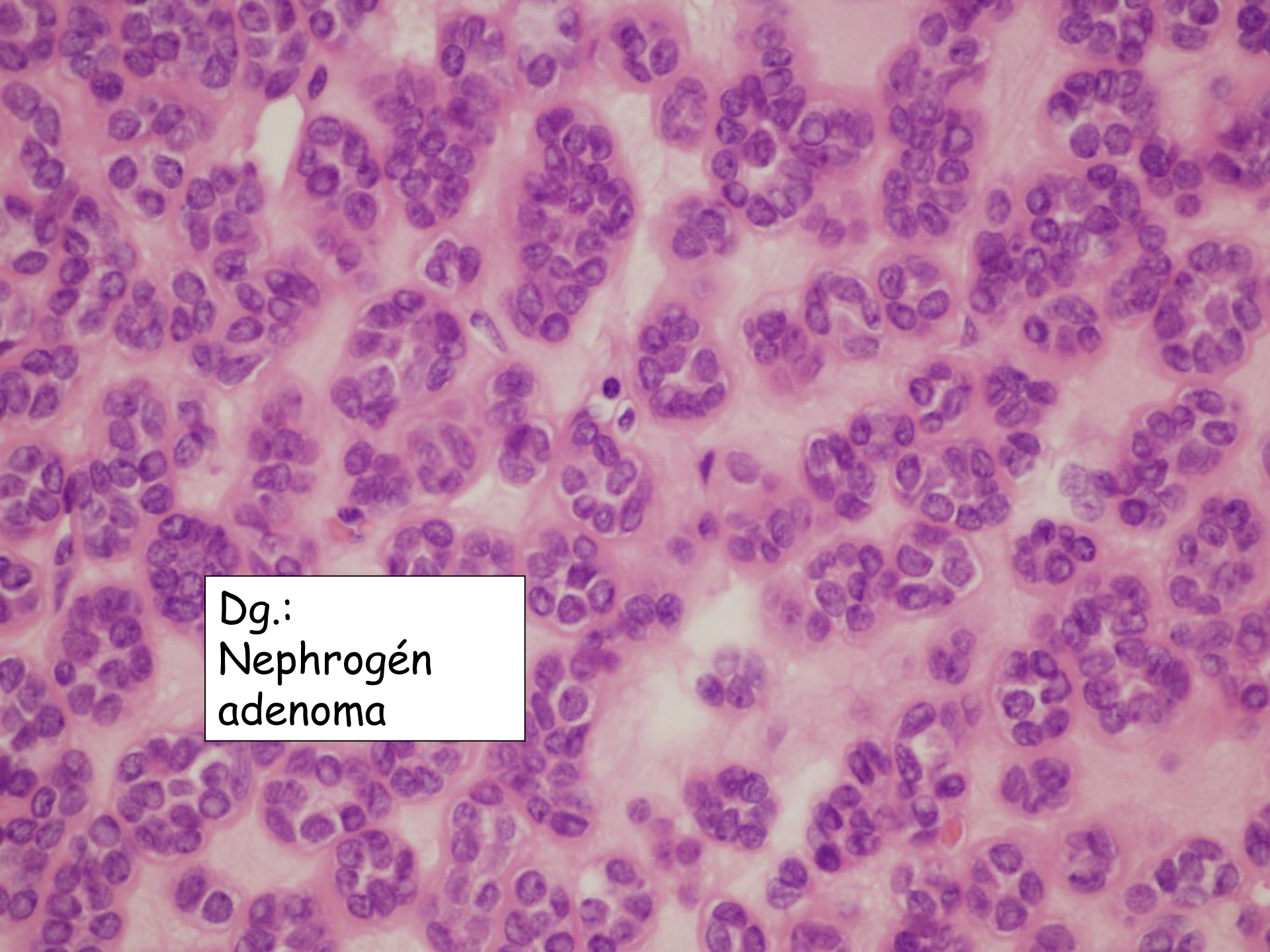


Female, 40 y/o.

Renal pole resection

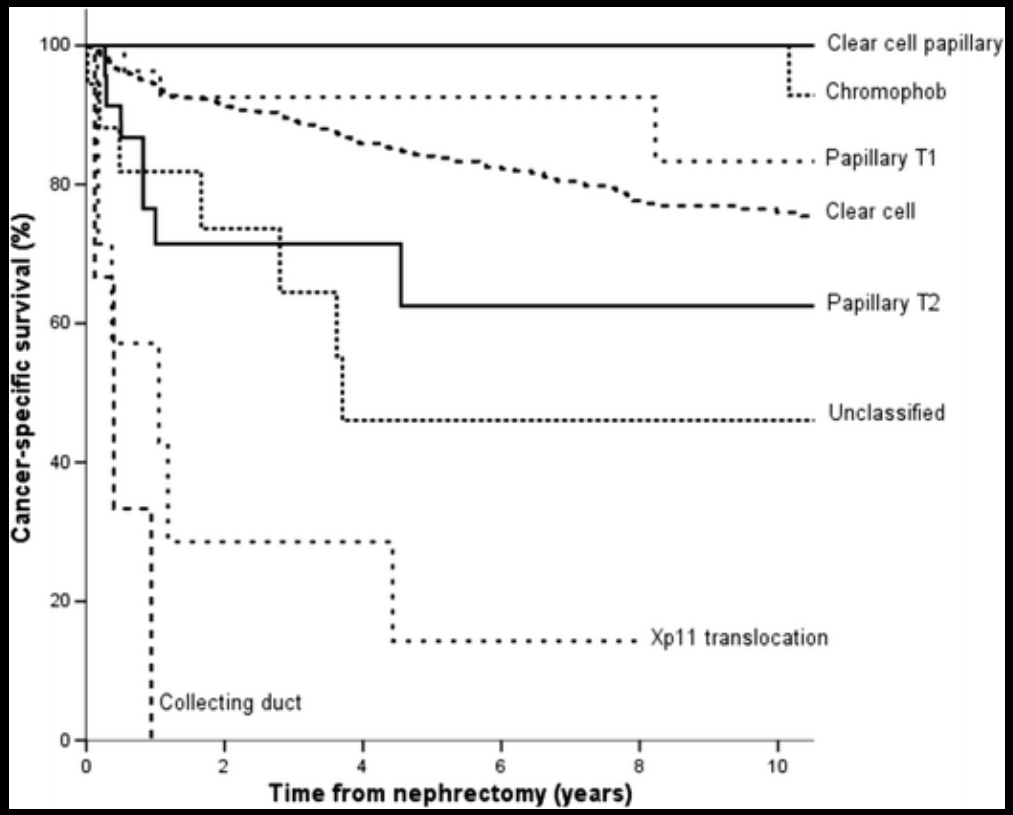
Hist.?




Dg.:
Nephrogén
adenoma

Prognostic facts

Tumor type



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Prognostic factors

Stage

pT:

pT1 – tumor ≤7 cm in greatest dimension, limited to the kidney (pT1a ≤4 cm, pT1b >4 cm)

pT2 – tumor >7 cm in greatest dimension, limited to the kidney (pT2a ≤10 cm, pT2b >10 cm)

pT3 – tumor extends into major veins (renal vein, VCI) or perinephric tissues (ERE)

(pT3a renal vein invasion and/or ERE, pT3b VCI invasion below diaphragm, pT3c VCI invasion above diaphragm)

pT4 – tumor invades beyond the Gerota fascia (including contiguous extension into the ipsilateral adrenal gland)

Prognostic facts

Table 2 Cox regression analysis for cancer-specific survival rates in non-metastatic clear cell RCC

Characteristic	Hazard ratio	CI 95%	*p* value
Univariate			
ISUP grade	7.50	5.01–11.21	<0.001
TNM stage	2.54	2.04–3.15	<0.001
Surgical margin status	2.95	1.57–5.53	<0.001
Microscopic tumor necrosis	6.74	4.53–10.07	<0.001
Rhabdoid/sarcomatoid change	5.14	3.39–7.78	<0.001
Giant tumor cells	3.93	2.51–6.15	<0.001
Multivariate			
ISUP grade	4.33	2.36–7.95	<0.001
TNM stage	1.86	1.49–2.33	<0.001
Surgical margin status	2.61	1.39–5.2	0.003
Microscopic tumor necrosis	1.69	0.93–3.05	0.081
Rhabdoid/sarcomatoid change	0.96	0.57–1.61	0.896
Giant tumor cells	0.67	0.4–1.13	0.139

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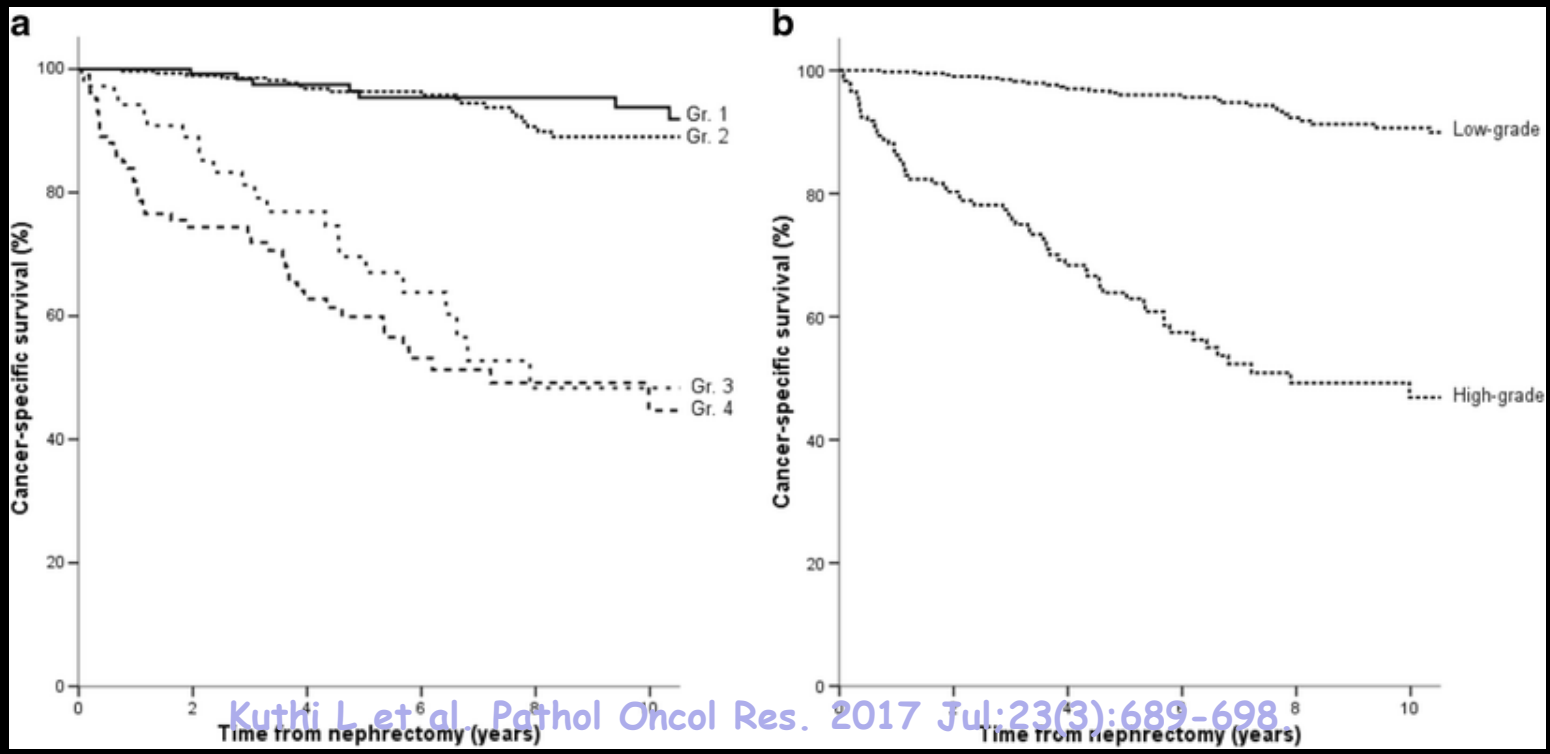
Prognostic facts

Grade:

Fuhrman grade/ISUP grade

Grade 1: Inconspicuous nucleoli at ×400 magnification and basophilic.
Grade 2: Clearly visible nucleoli at ×400 magnification and eosinophilic.
Grade 3: Clearly visible nucleoli at ×100 magnification.



Kuthi L et al. Pathol Oncol Res. 2017 Jul;23(3):689-698.

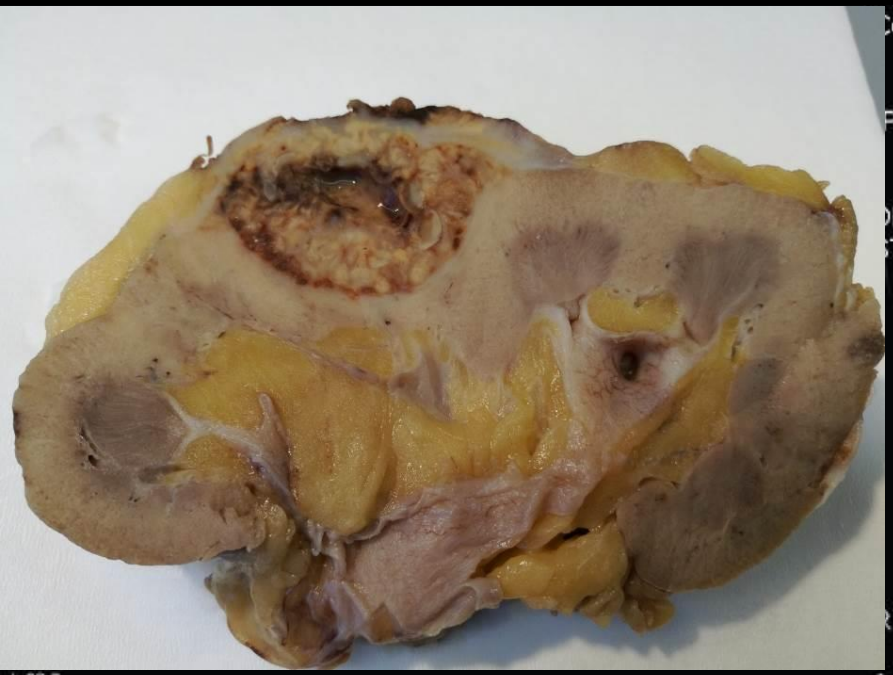
Treatment

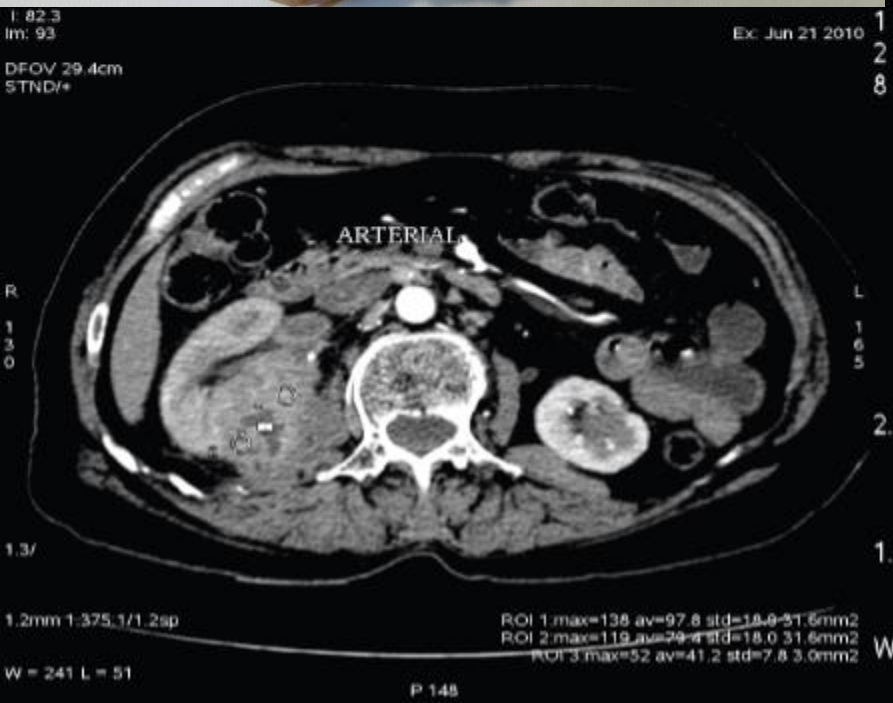
Partial (pT1 tumors) or radical nephrectomy (open or laparoscopic surgery)

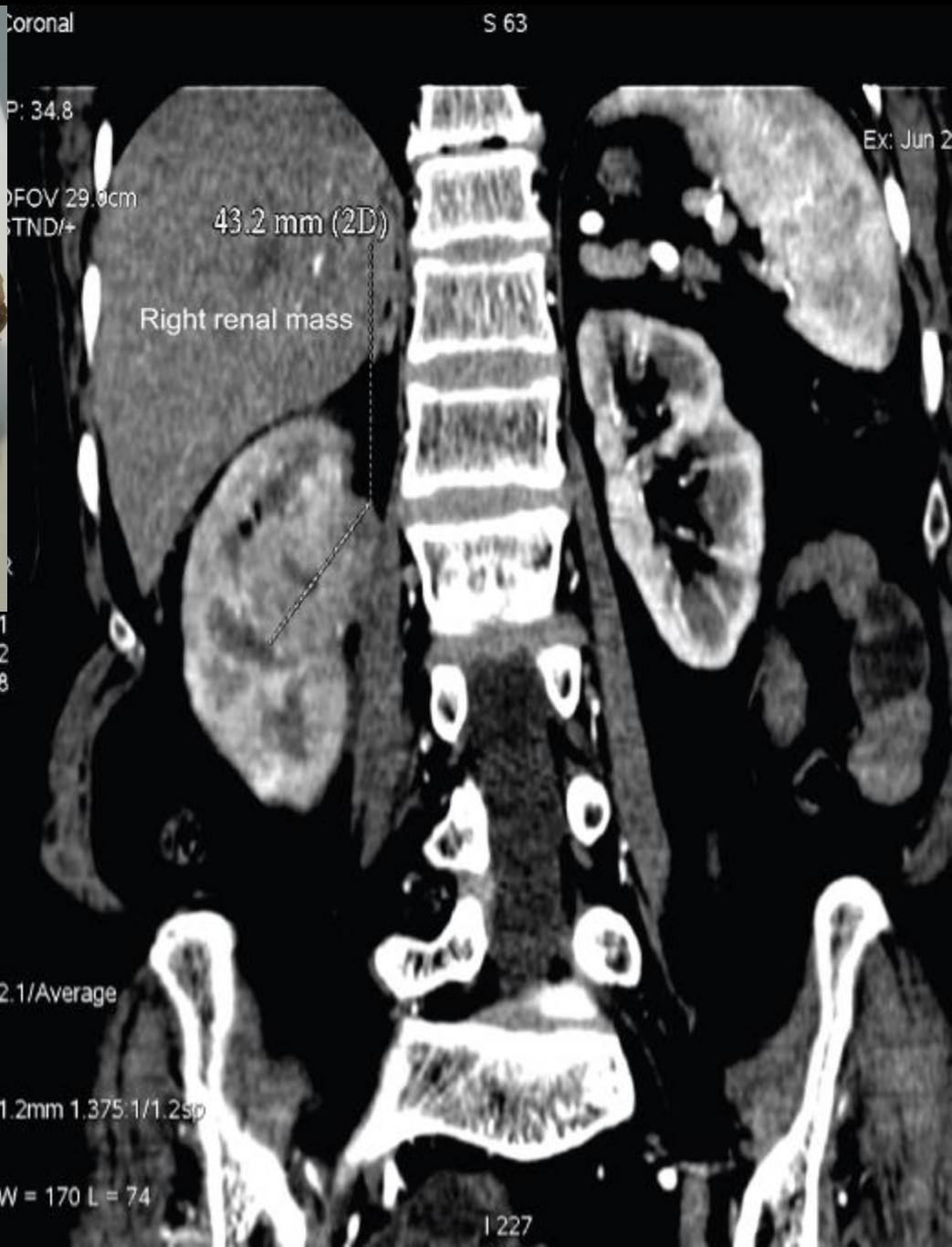
Targeted therapy (metastatic cases): sunitinib,

Diagnostic difficulties

Challenge of the radiologist and pathologist




I: 82.3
Im: 93
Ex: Jun 21 2010
DFOV 29.4cm
STND/+
ARTERIAL
R
L
1.2mm 1.375:1/1.2sp
W = 241 L = 51
P 148

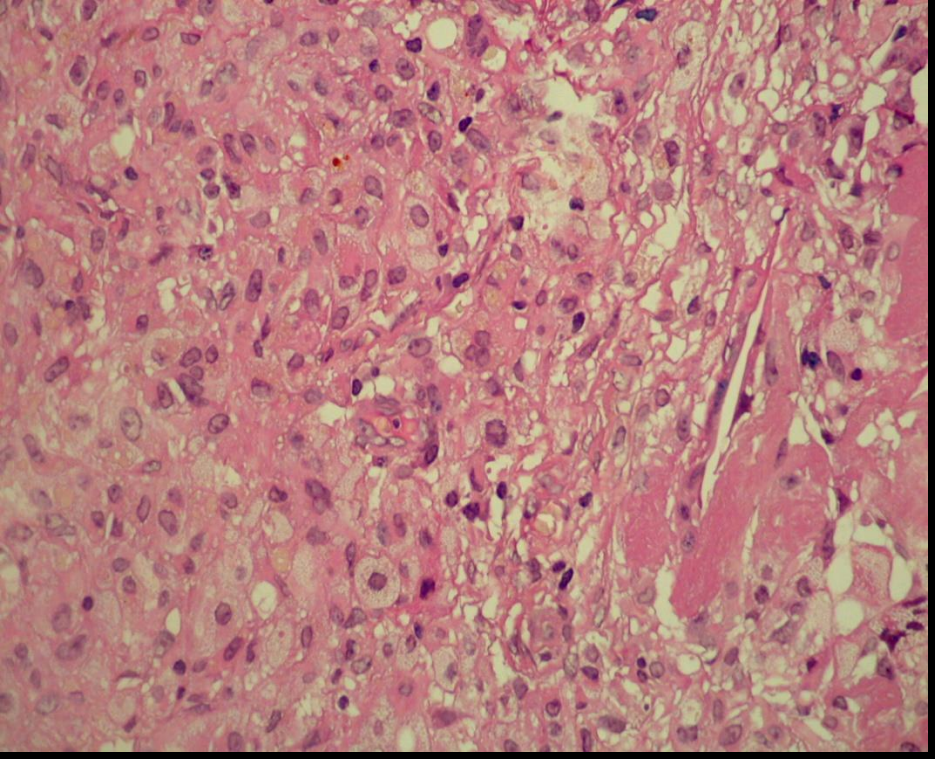

Coronal
S 63
P: 34.8
Ex: Jun 2
DFOV 29.0cm
STND/+
43.2 mm (2D)
Right renal mass
2.1/Average
1.2mm 1.375:1/1.2sp
W = 170 L = 74
I 227

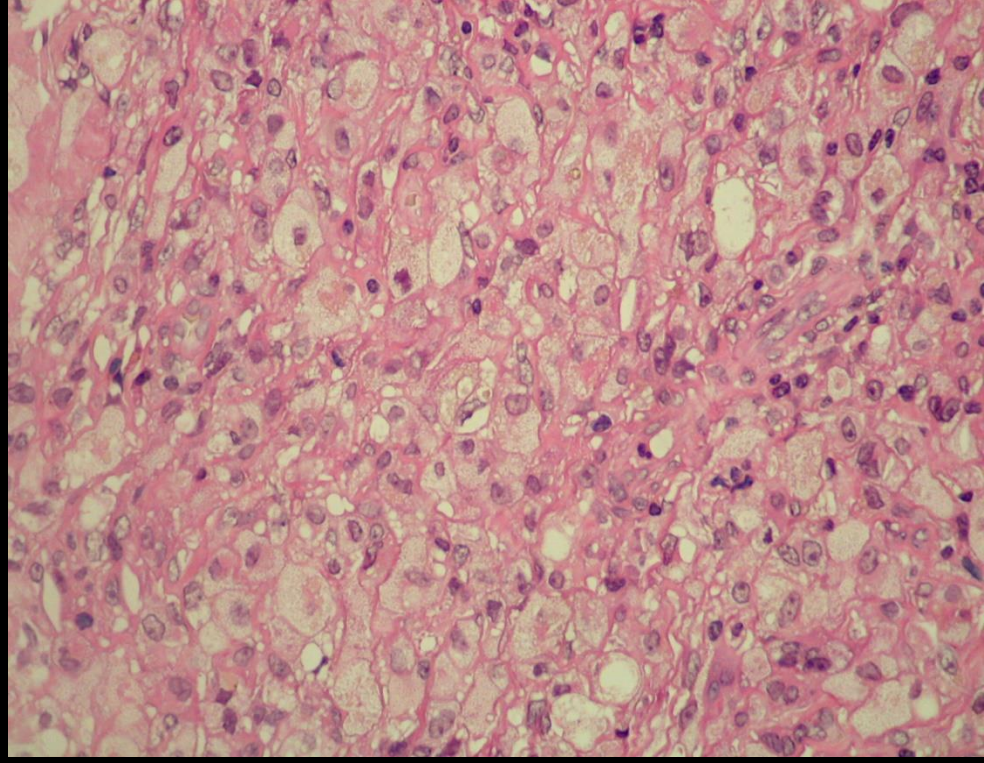
47 y/o woman

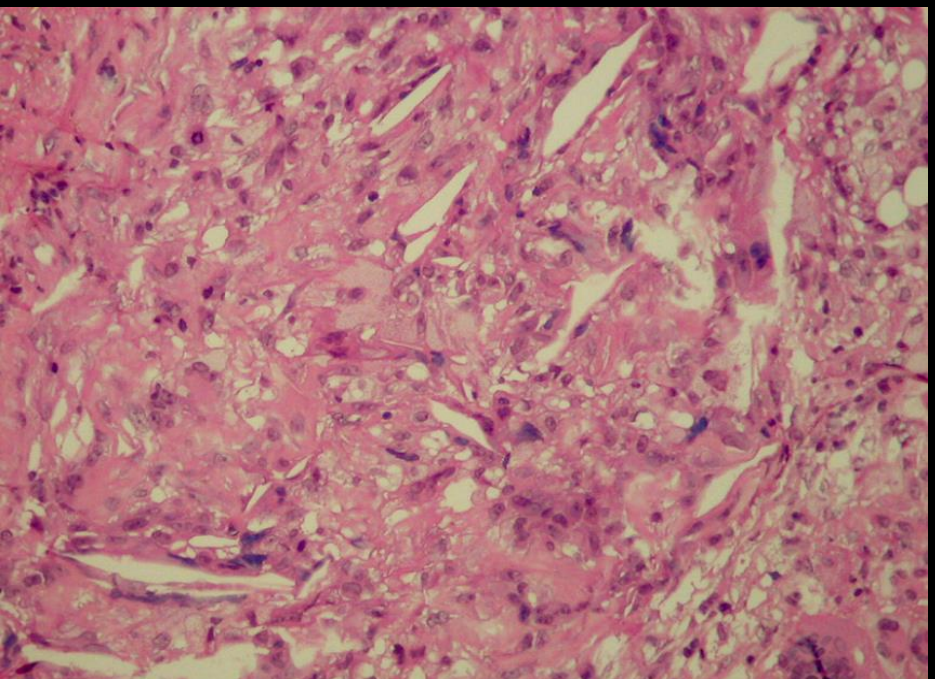
Nephrectomy for RCC 3 years earlier

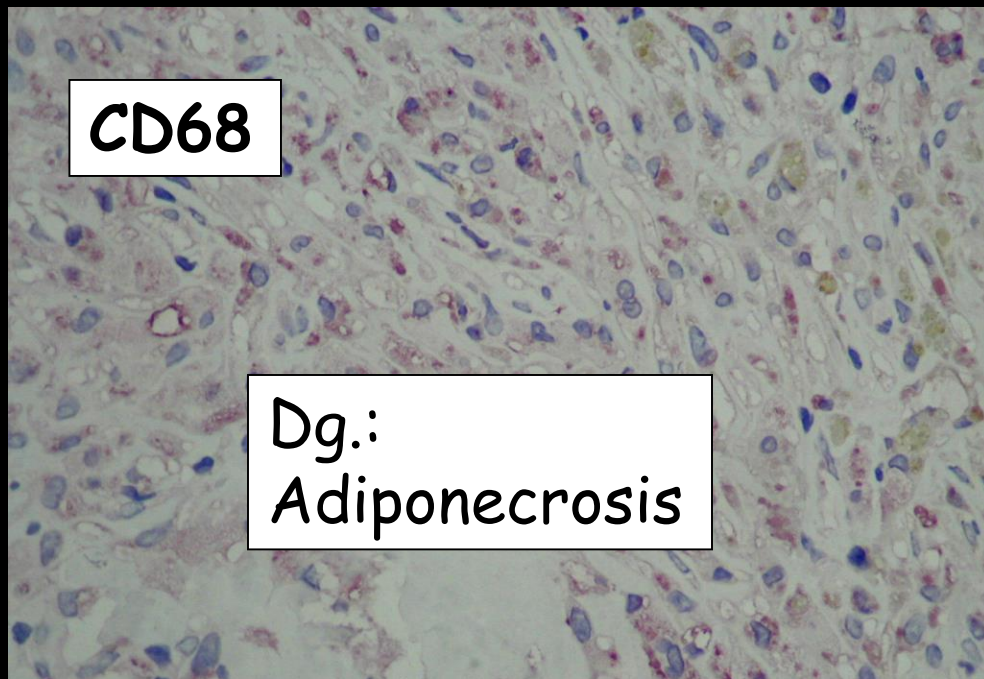
Multiple hypoechoic lesions in the retroperitoneal region and omentum

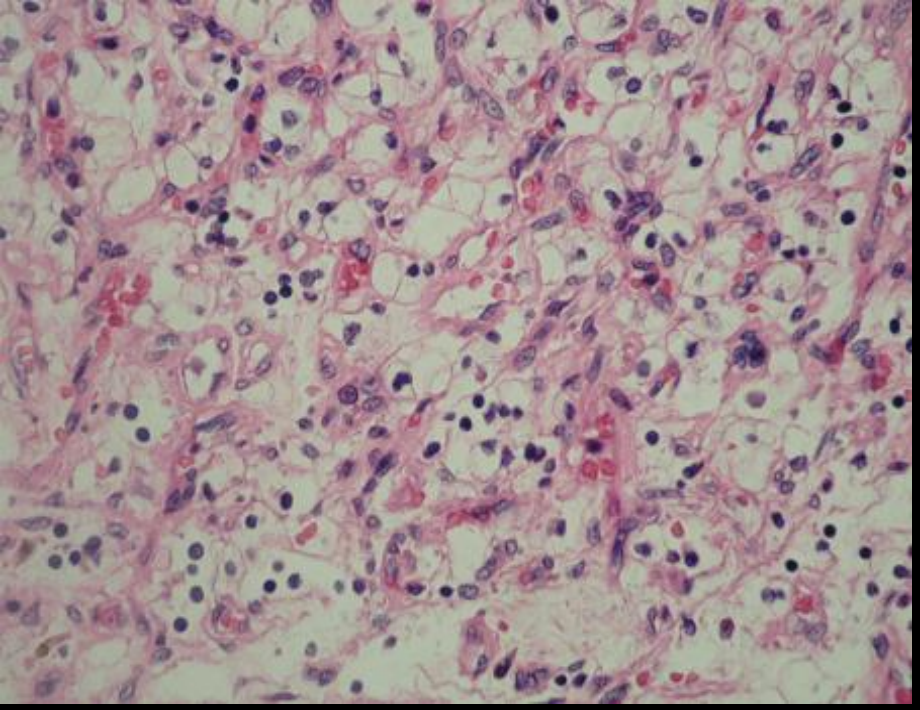
Met.?

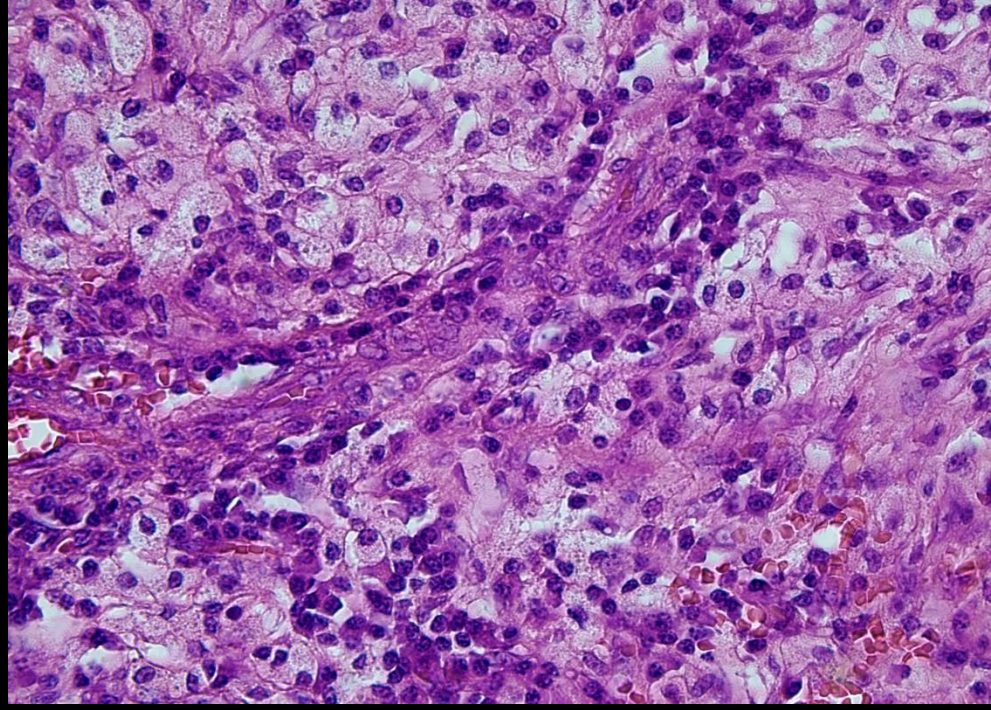


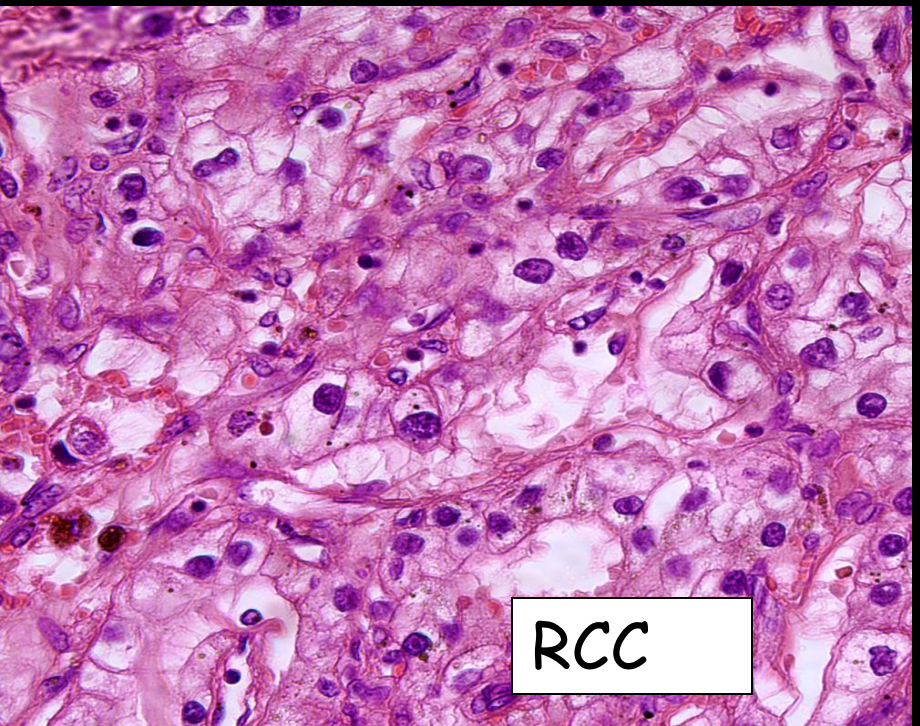


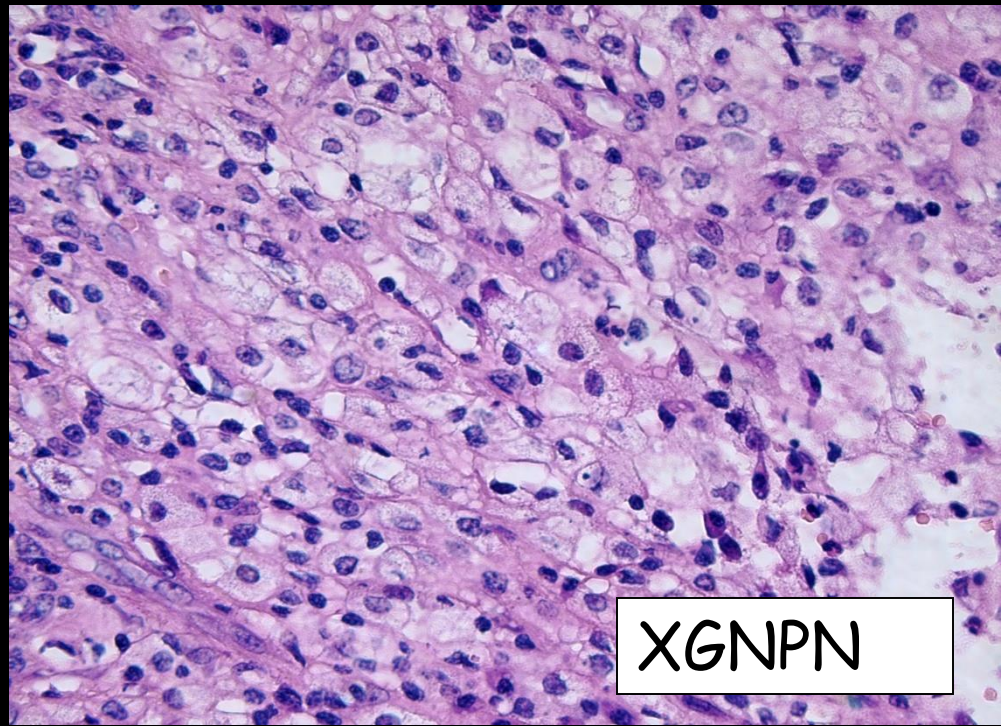



CD68
Dg.:
Adiponecrosis





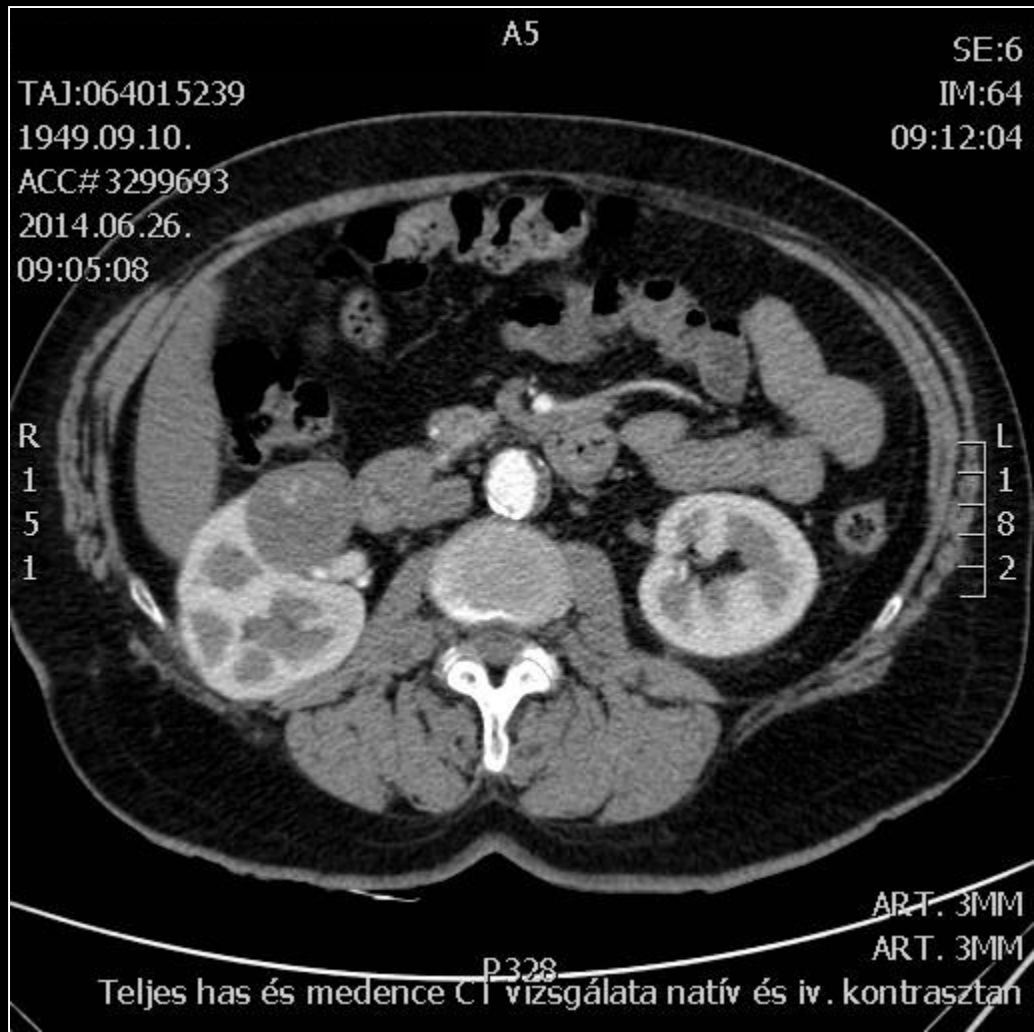

RCC

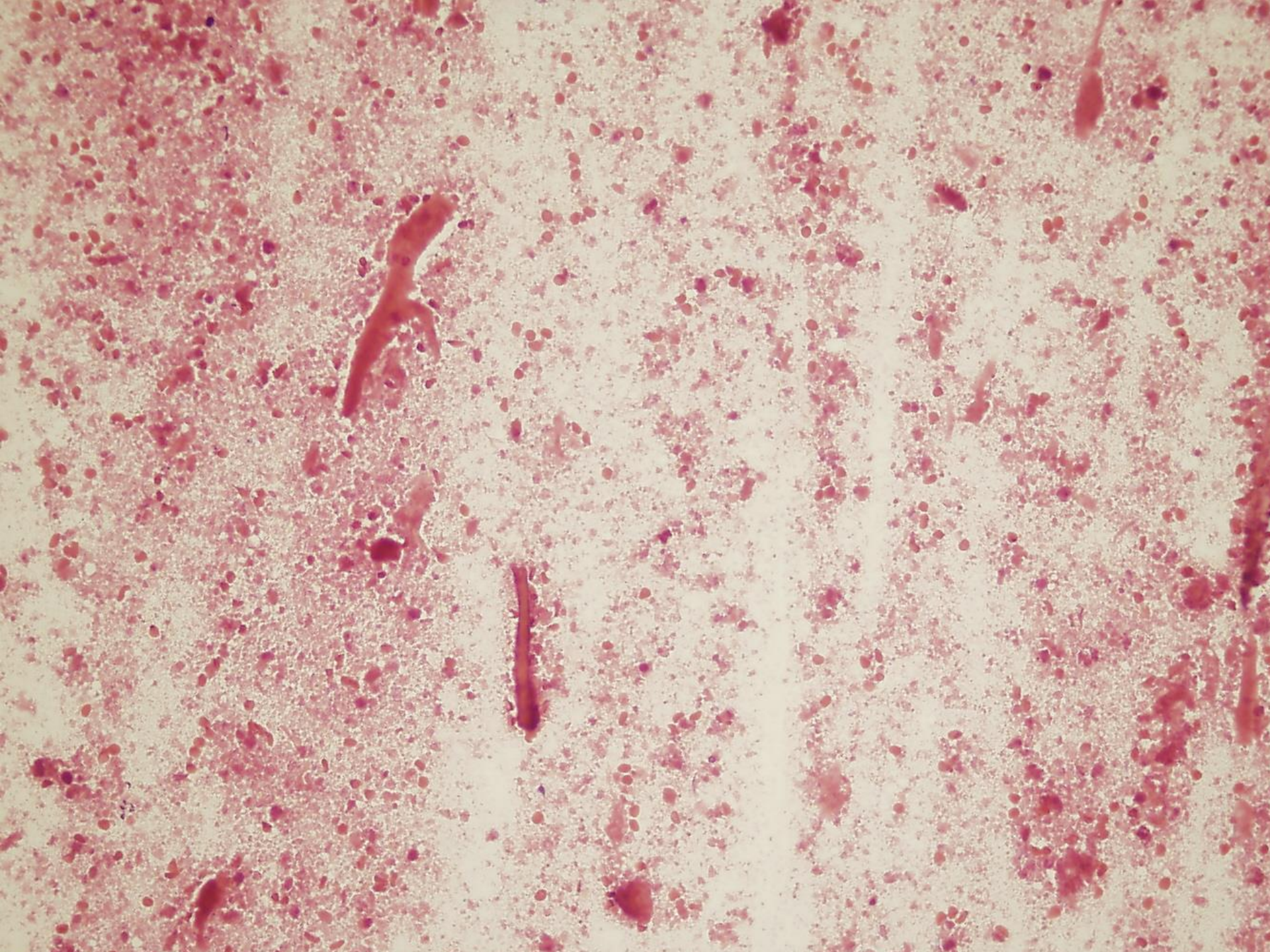

XGNPN

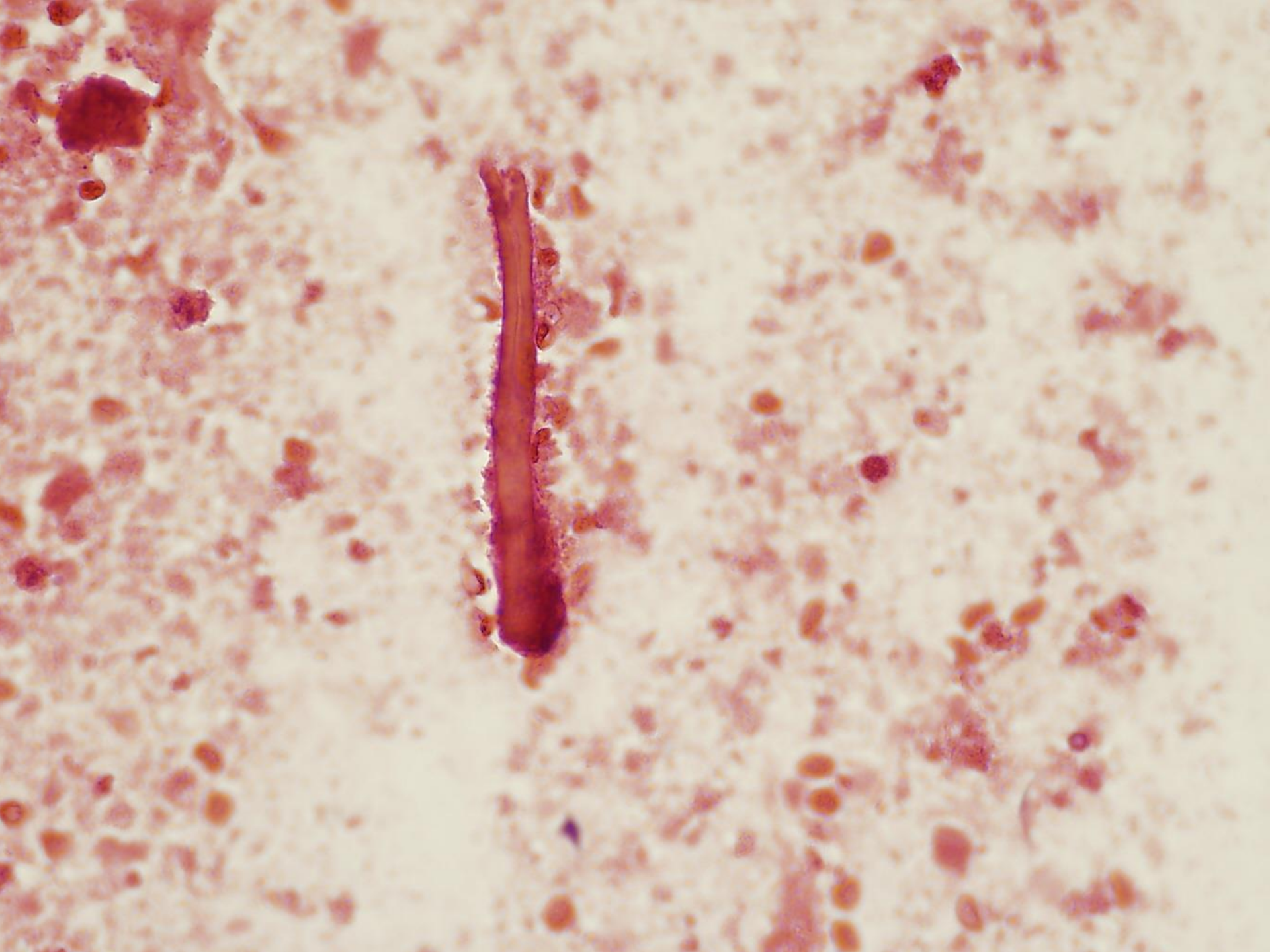
Female, 65 y/o

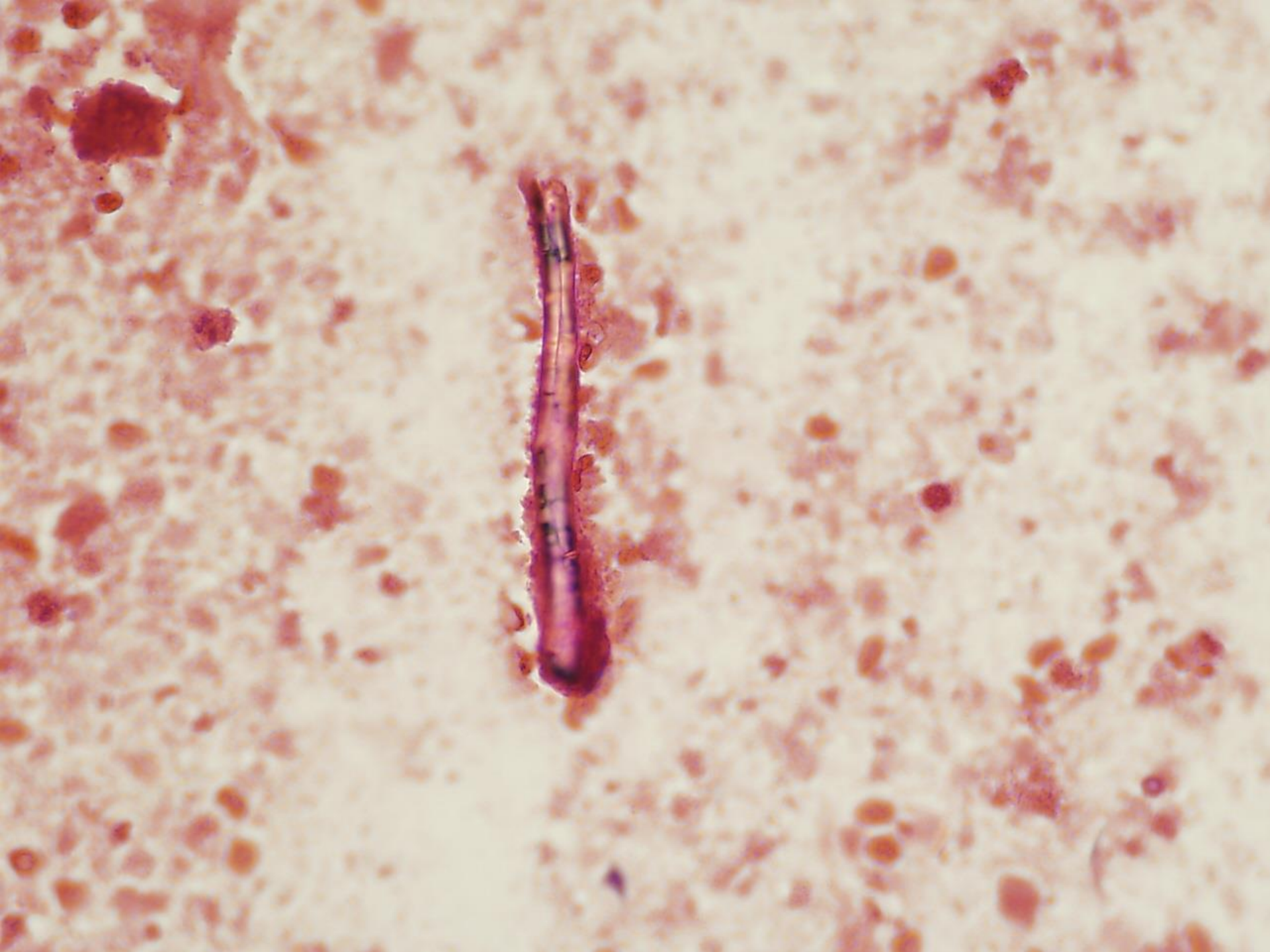
Resection of the upper pole of the kidney, 20 y-s earlier

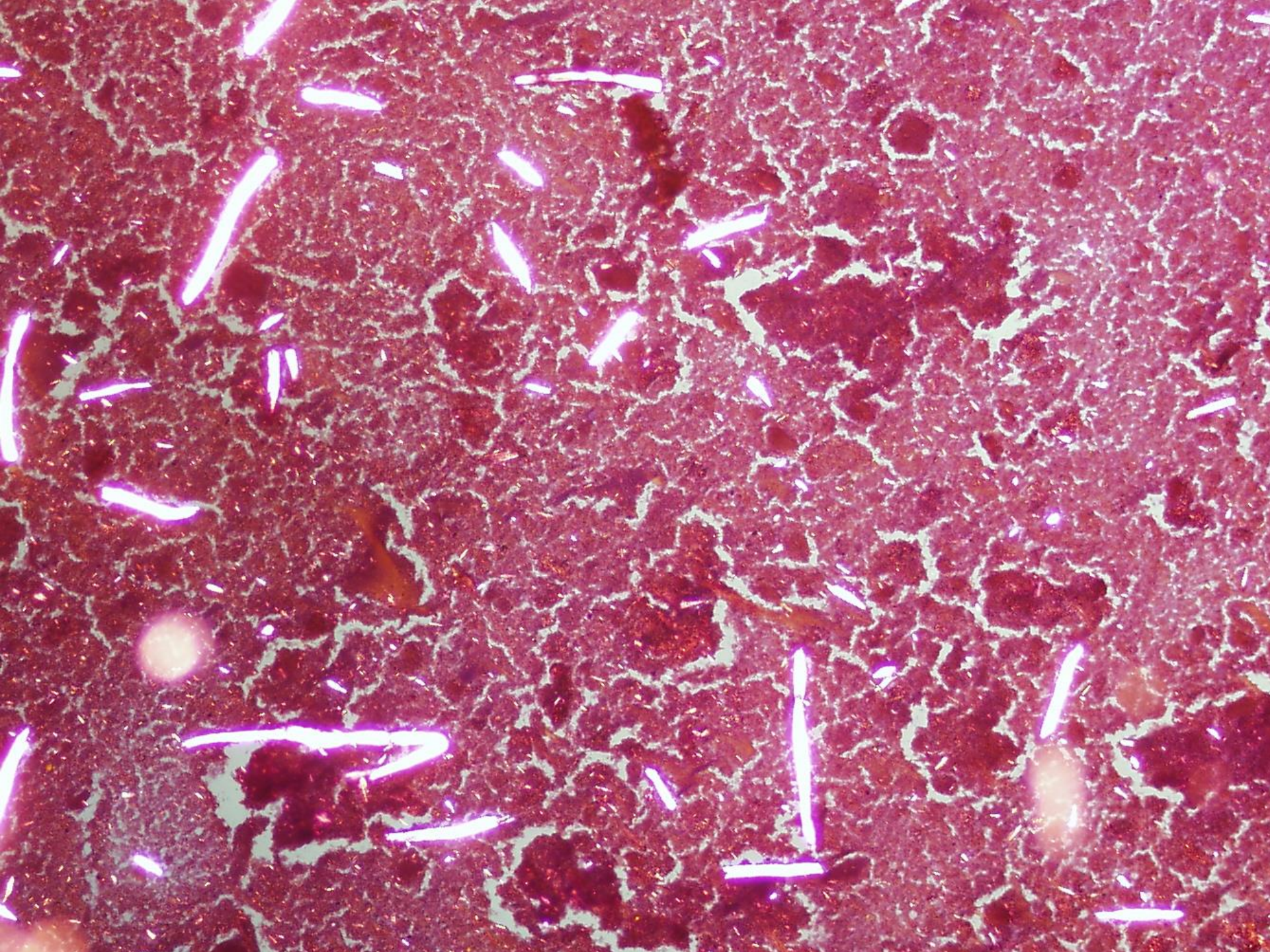
CT control: protruding hypoechoic tumor of 3 cm in diam.









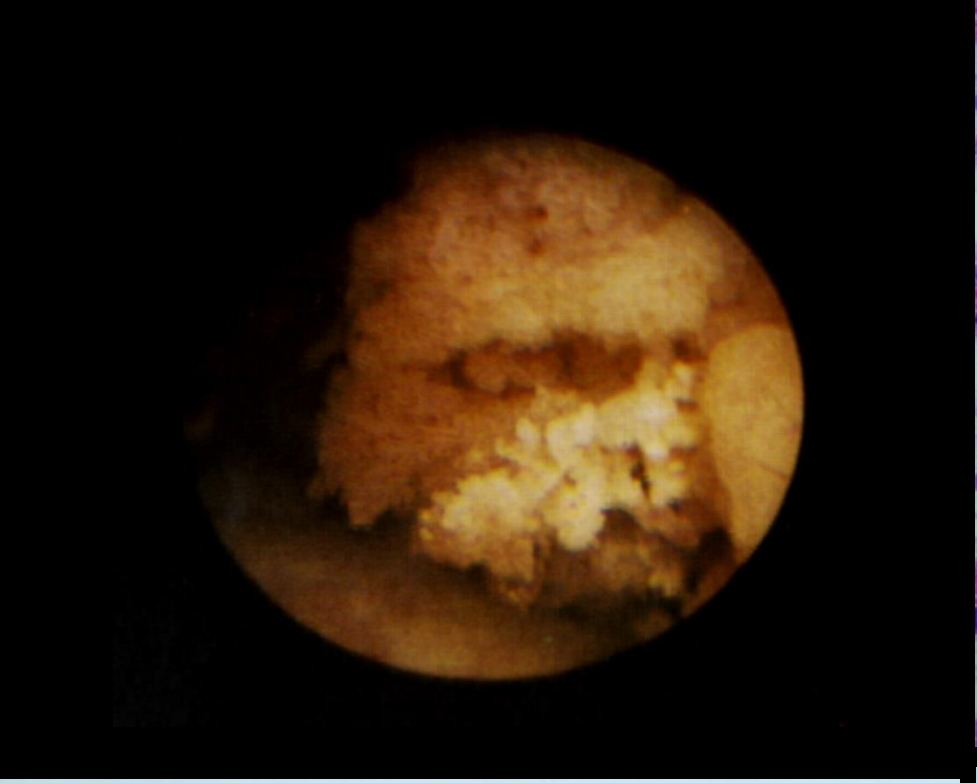


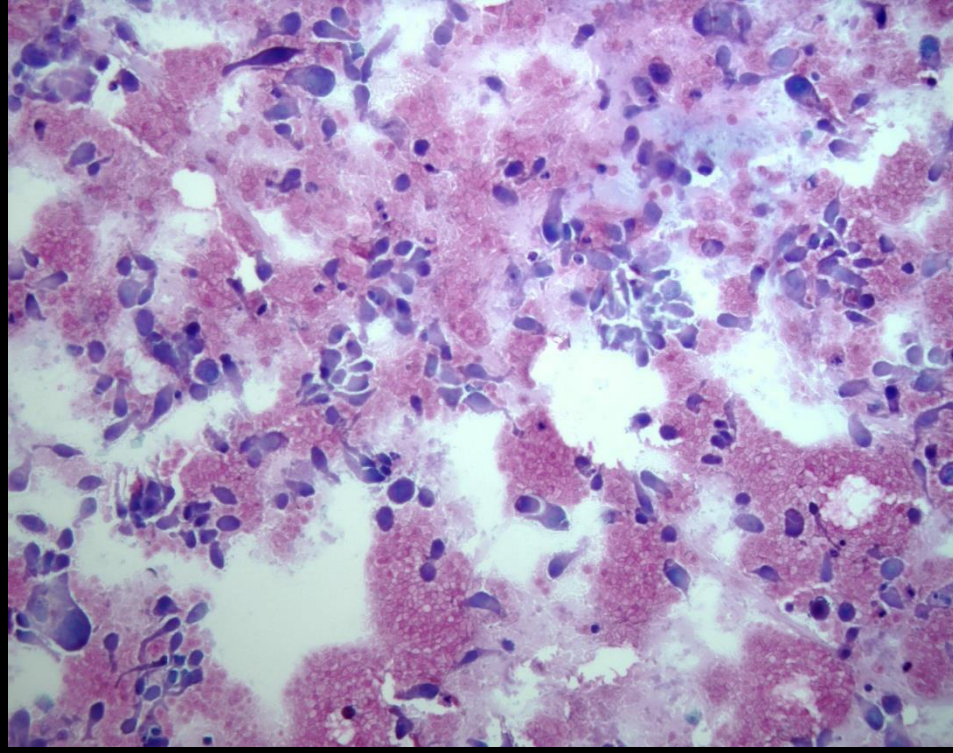
63 y/o female

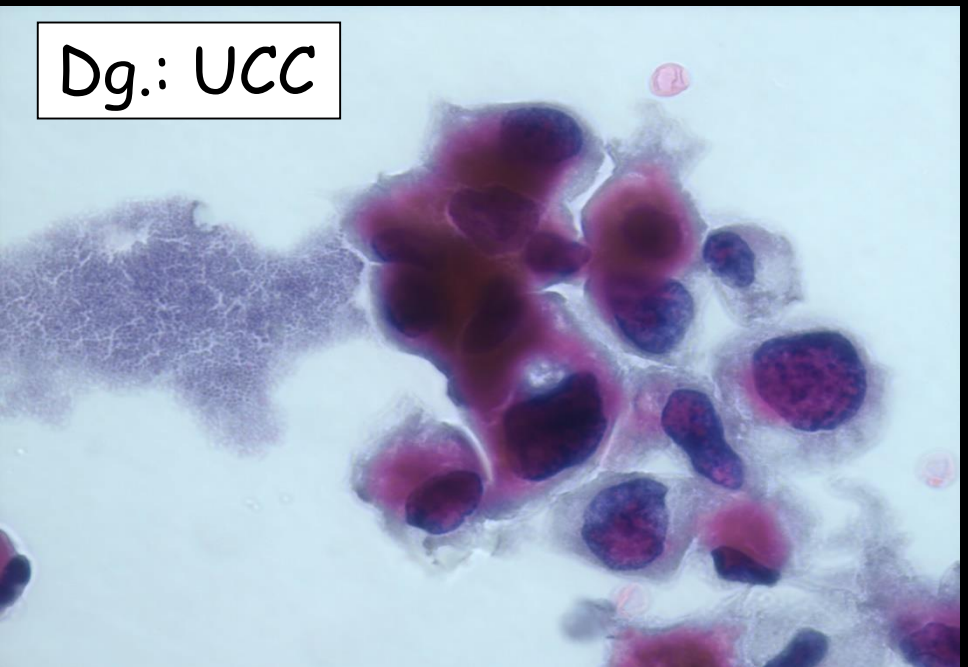
Smoker

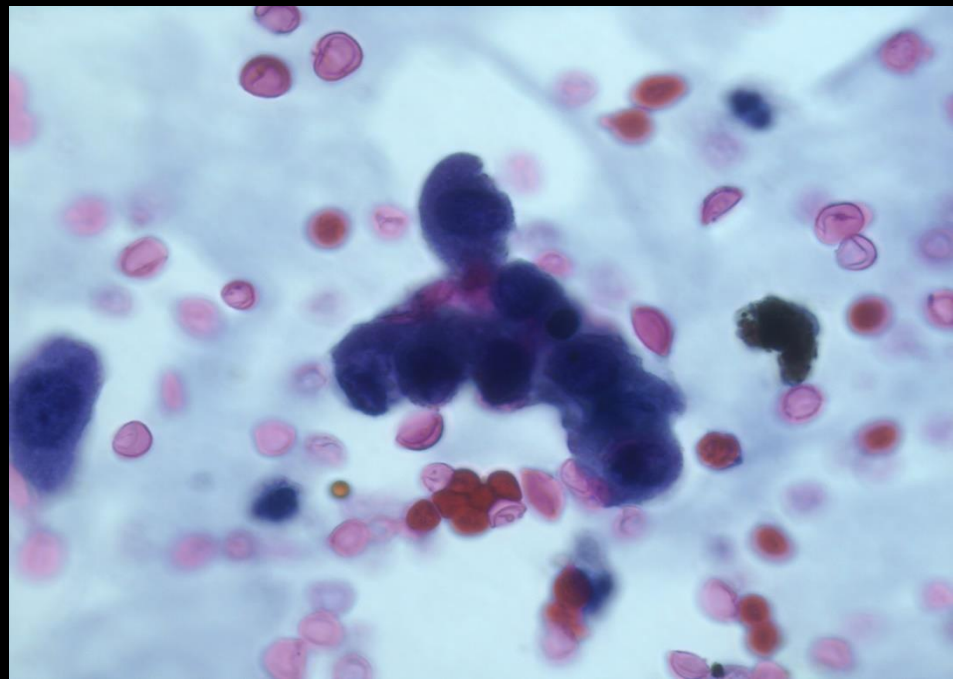
Flank pain, hematuria

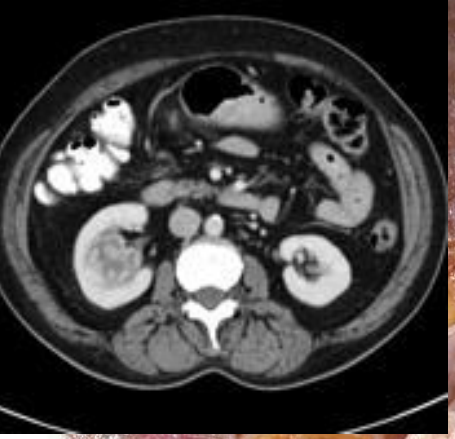
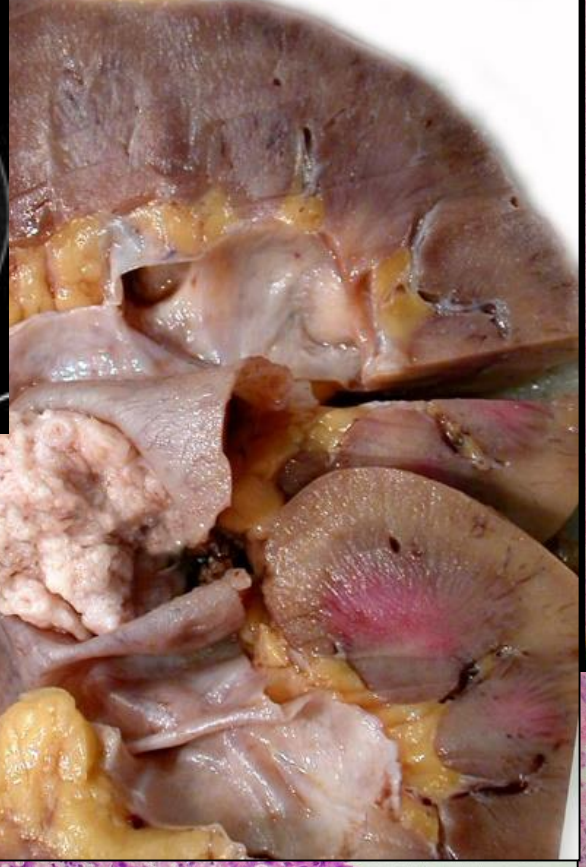
Ureteroscope: papillary tumor

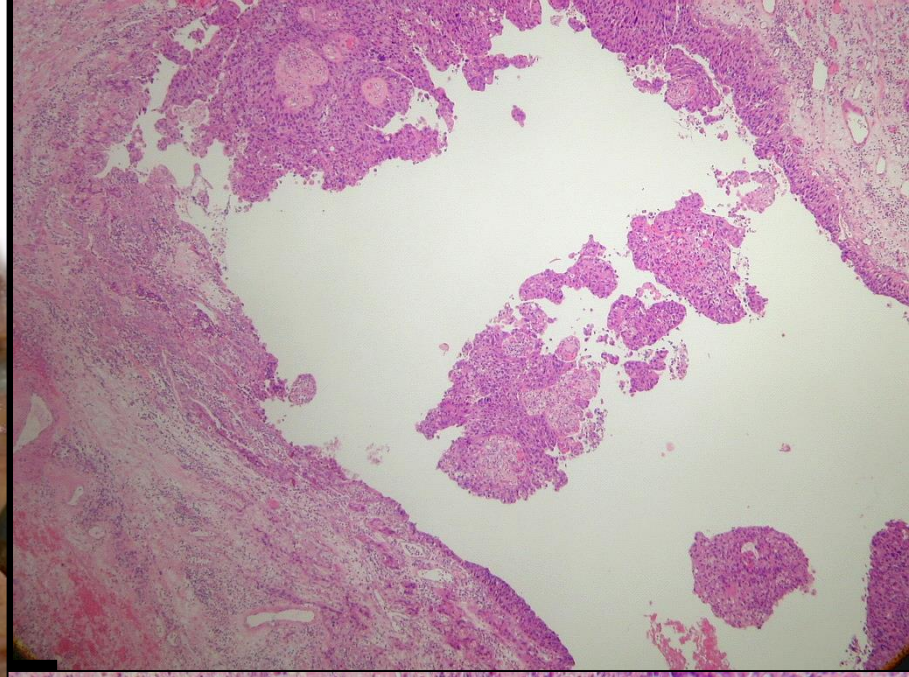
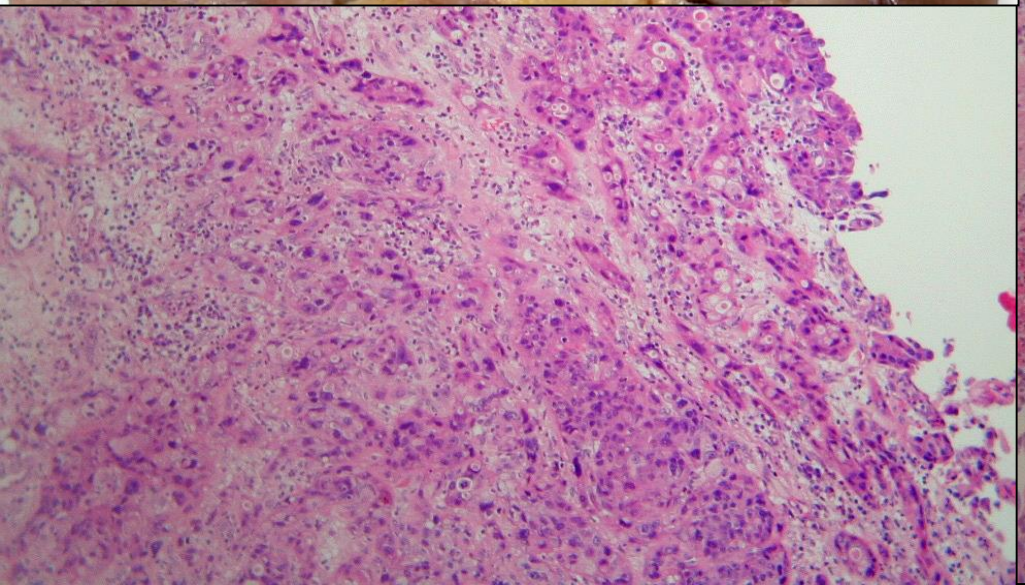
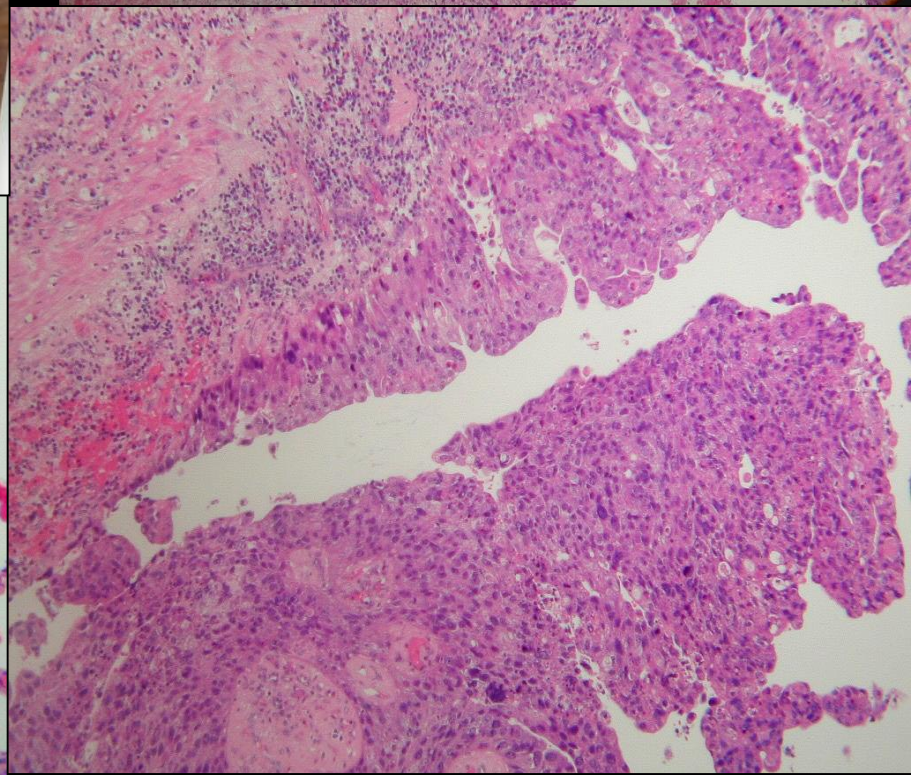


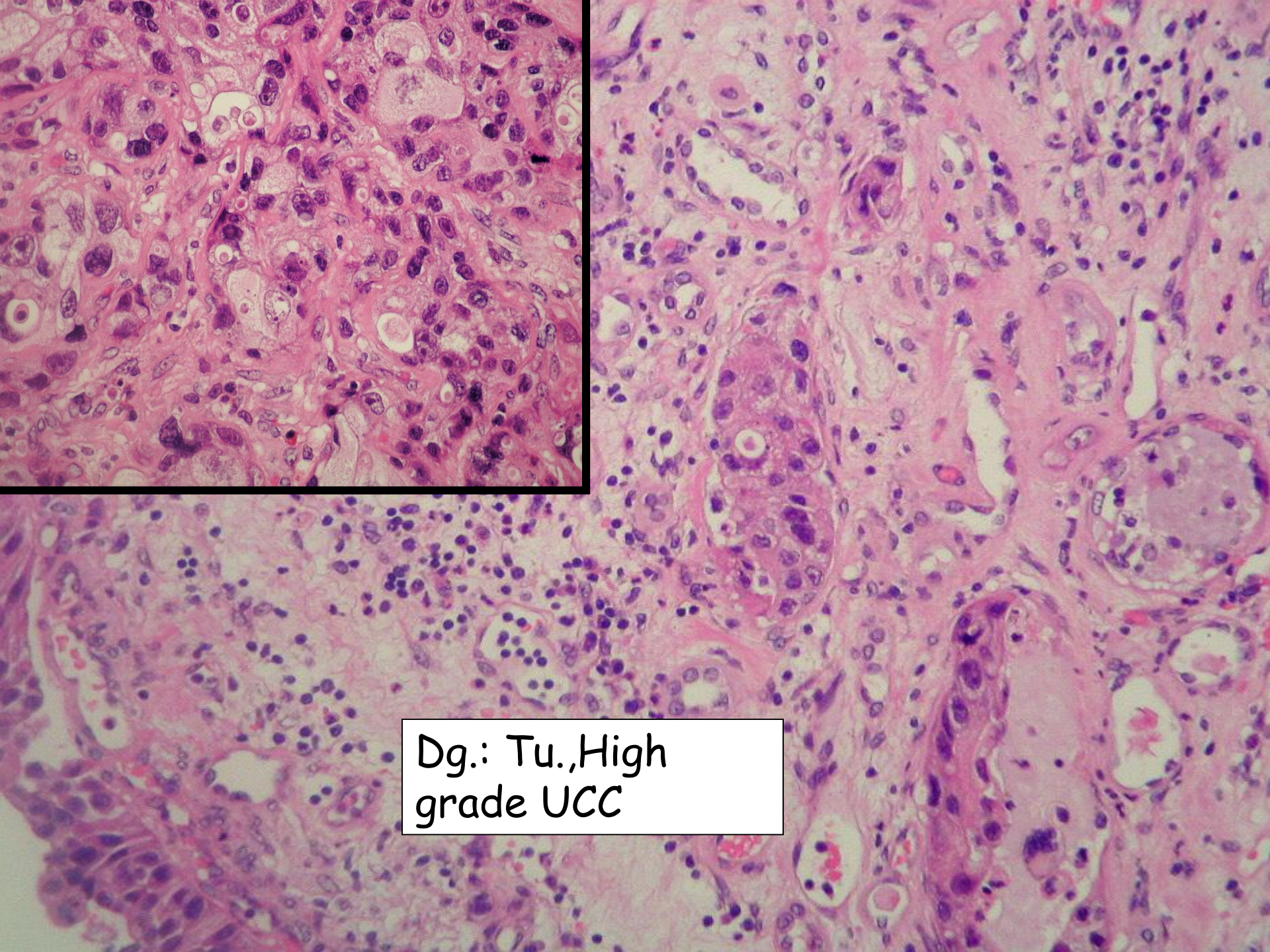



Dg.: UCC




Dg.: Tu.,High grade UCC

Urothelial (Transitional cell) carcinoma- (UCC) -symptoms

Hematuria

Hydronephrosis

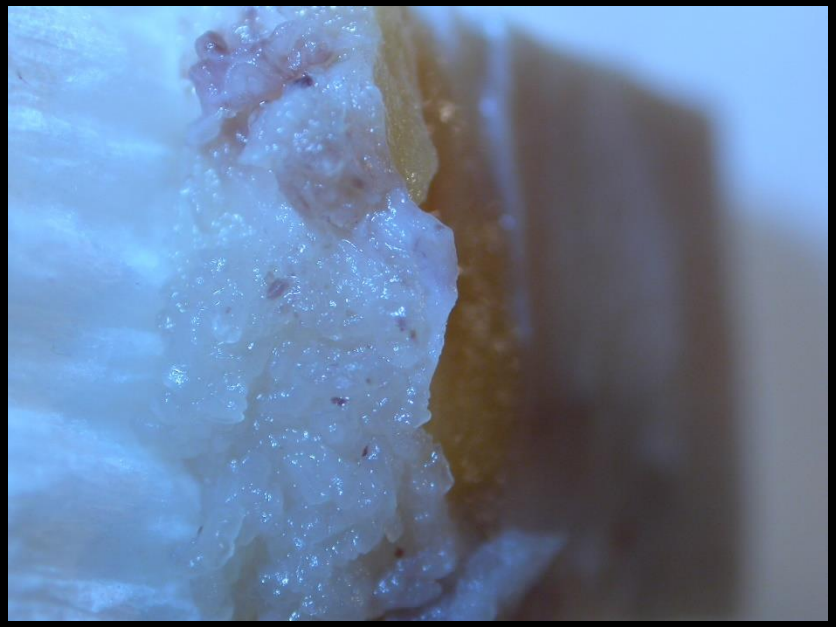
Pain

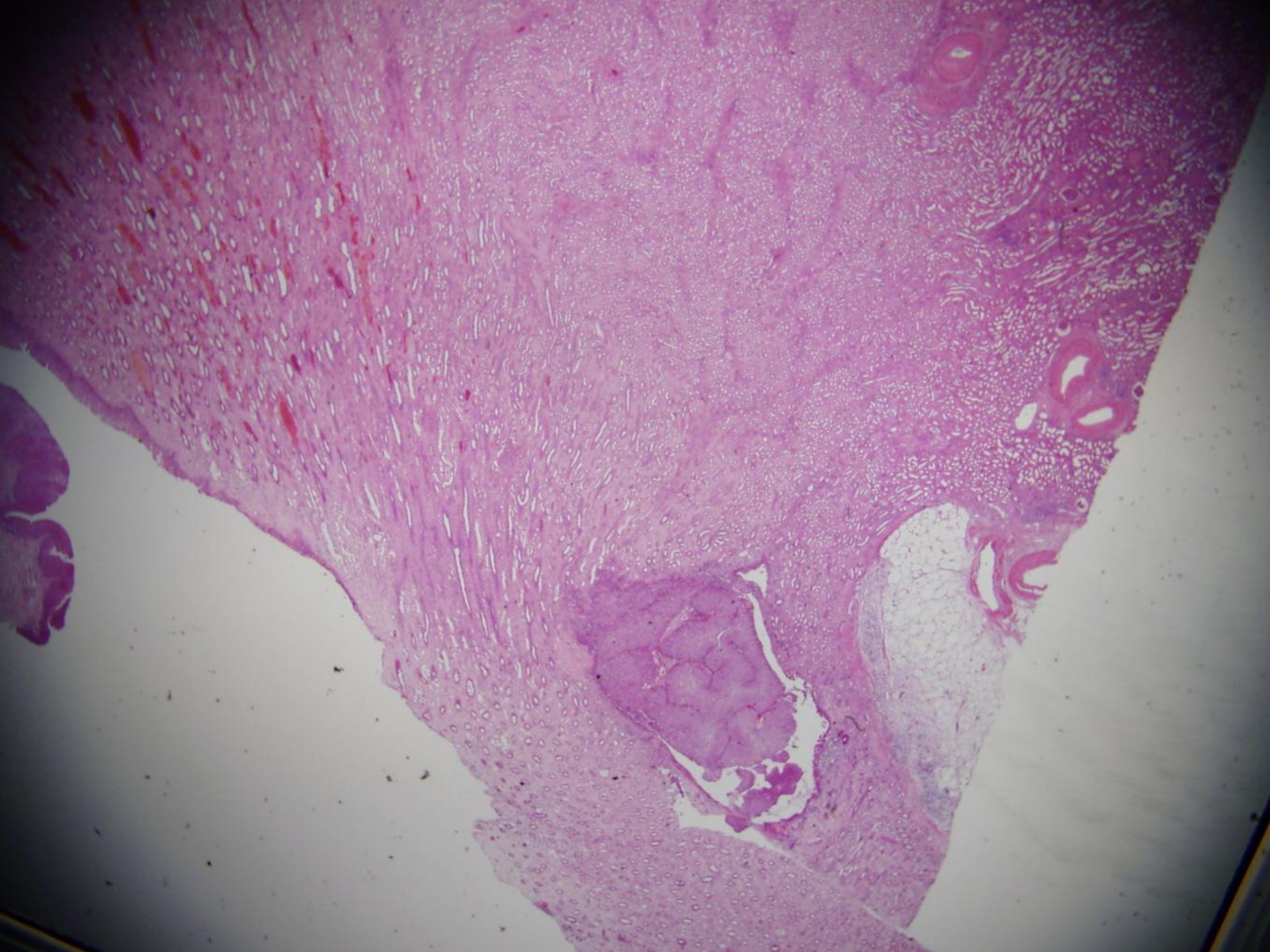
(Chr. aberrations: 9 monosomy, 9p,9q, 17p, 13q, 11p, 14q del.)

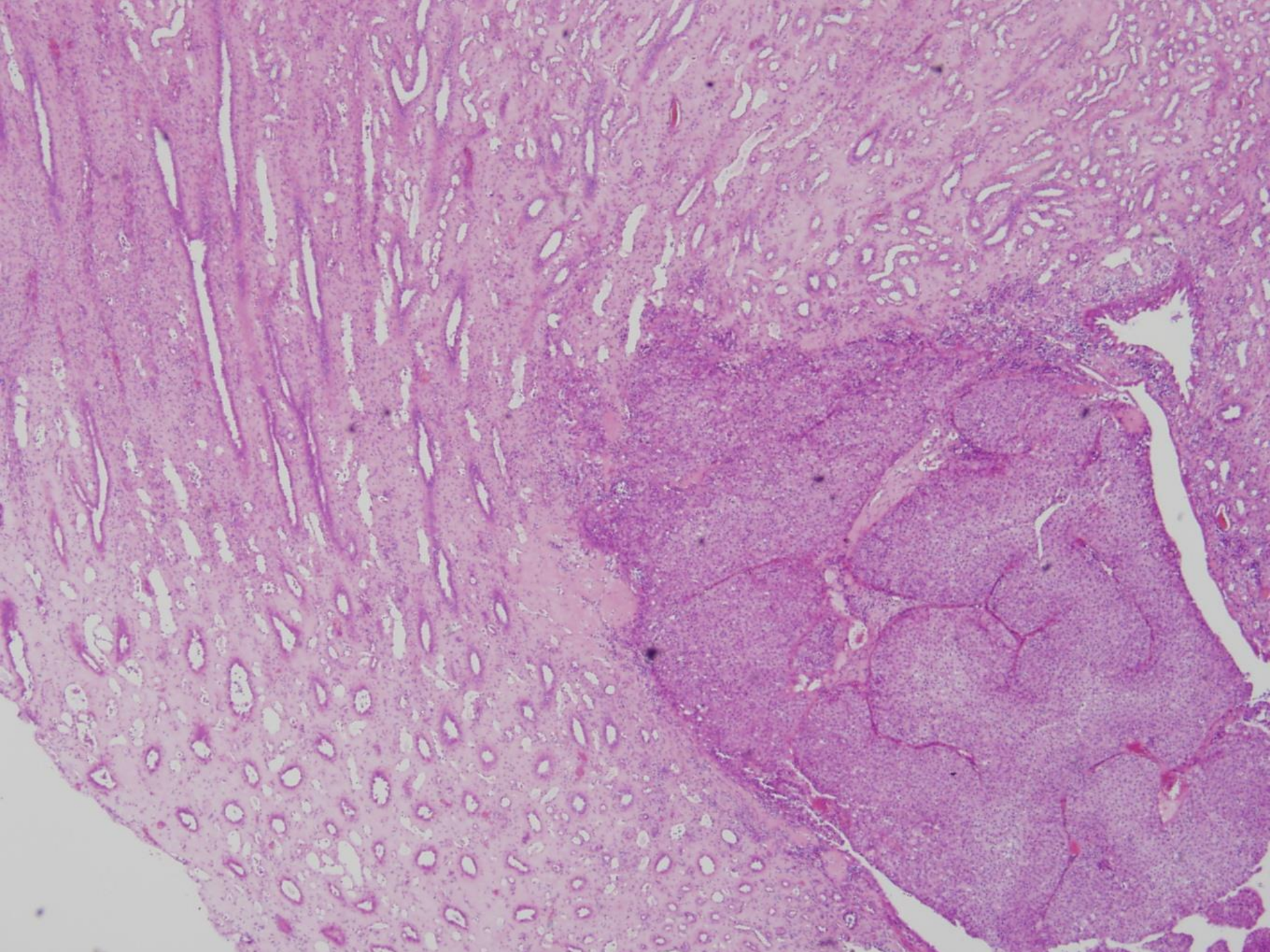
Male, 60 y/o

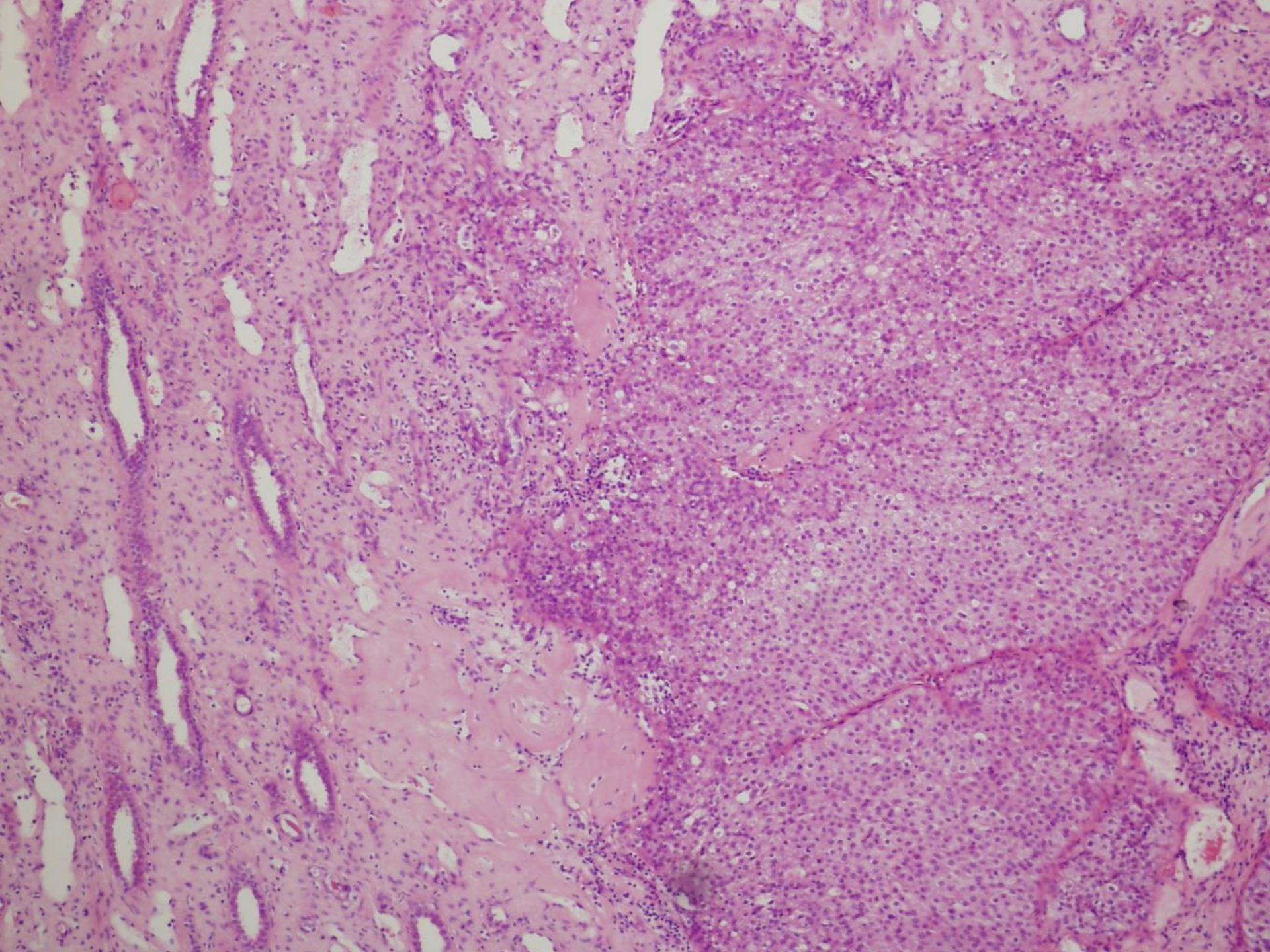
Anaemia

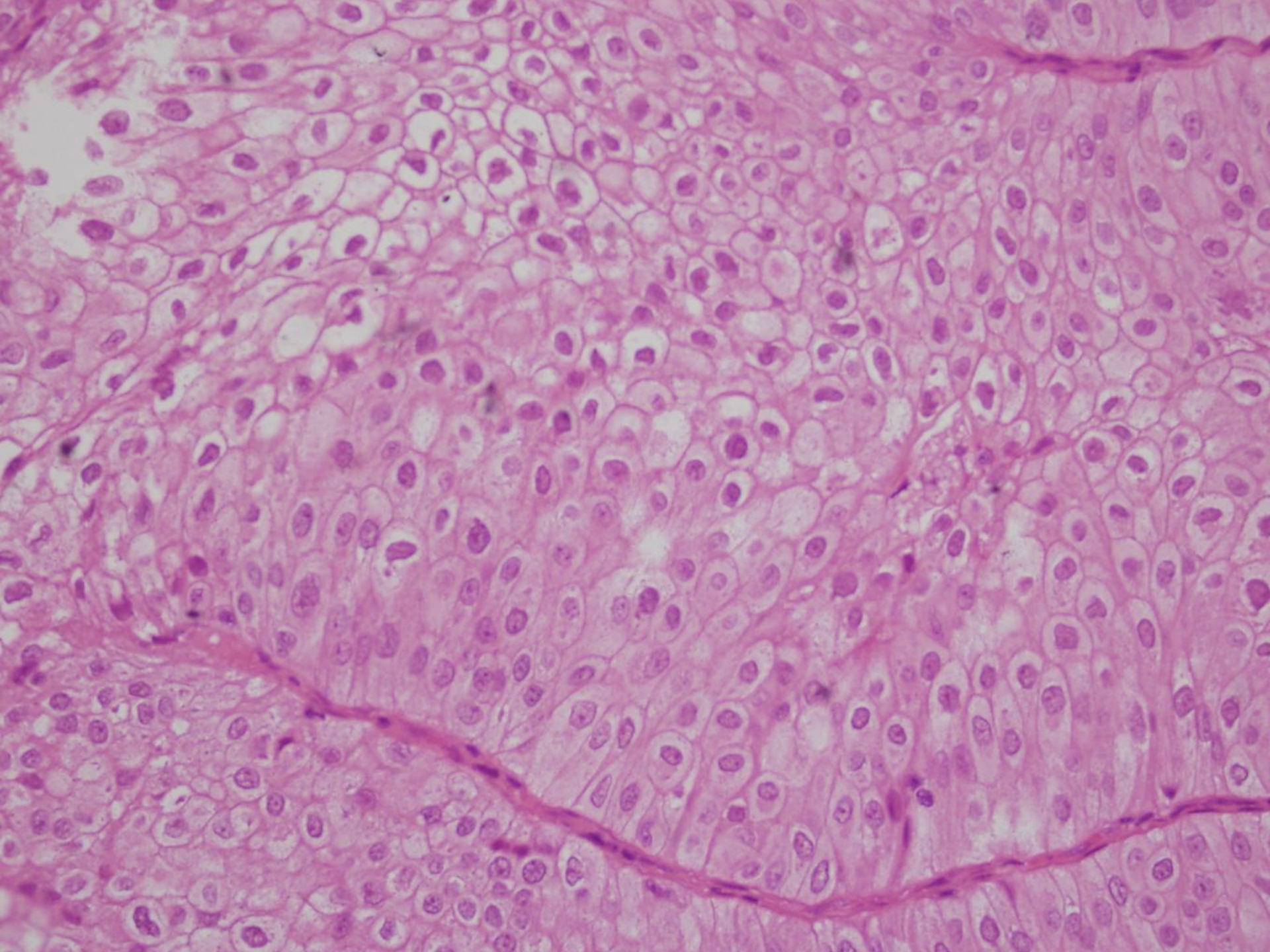
Haematuria











Acknowlegement

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