# Renal Neoplasms

# Renal neoplasms

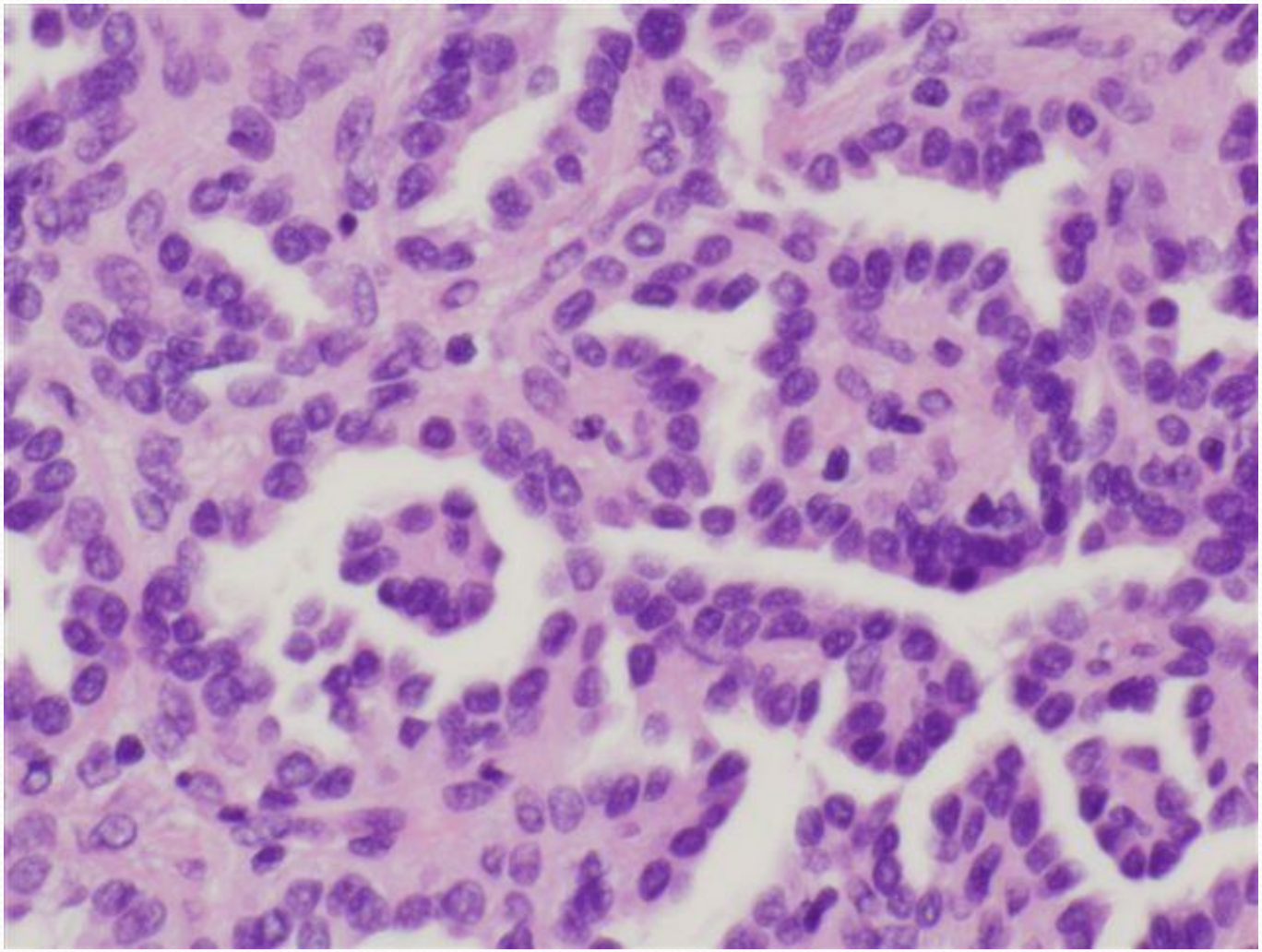
- ***Benign tumors***
  - ***Renal Papillary Adenoma***
  - ***Angiomyolipoma - uncommon***
  - ***Oncocytoma - uncommon***
- ***Malignant tumors***
  - ***Renal cell carcinoma***
  - ***Wilms tumor***
  - ***Transitional cell carcinoma of renal pelvis***

# Renal Papillary Adenoma

- ***Small, discrete tumors <0.5 cm***
- ***Gross:*** ***Pale yellow-gray, well circumscribed nodules in the cortex***
- ***M/E:*** ***Complex branching papillary structures.***

  ***Cells have regular small nuclei with scanty cytoplasm, no atypia***
- ***Size*** ***>3cm – potentially malignant***

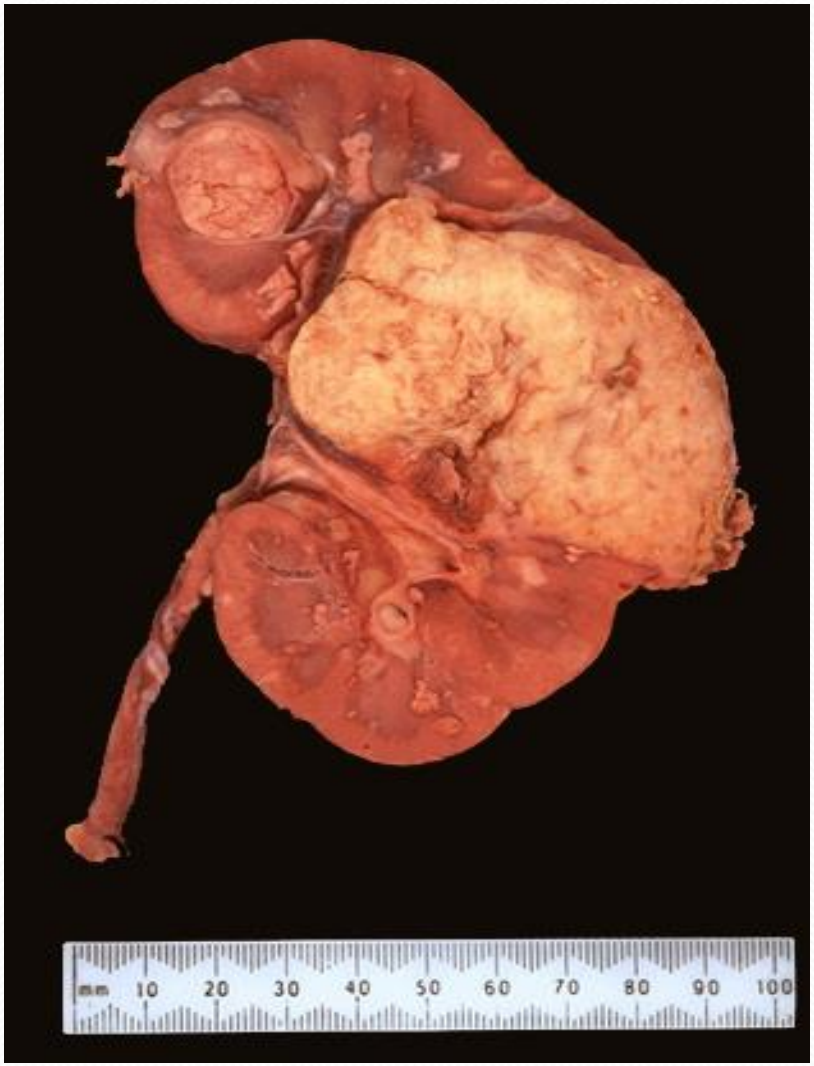
# Renal Papillary Adenoma

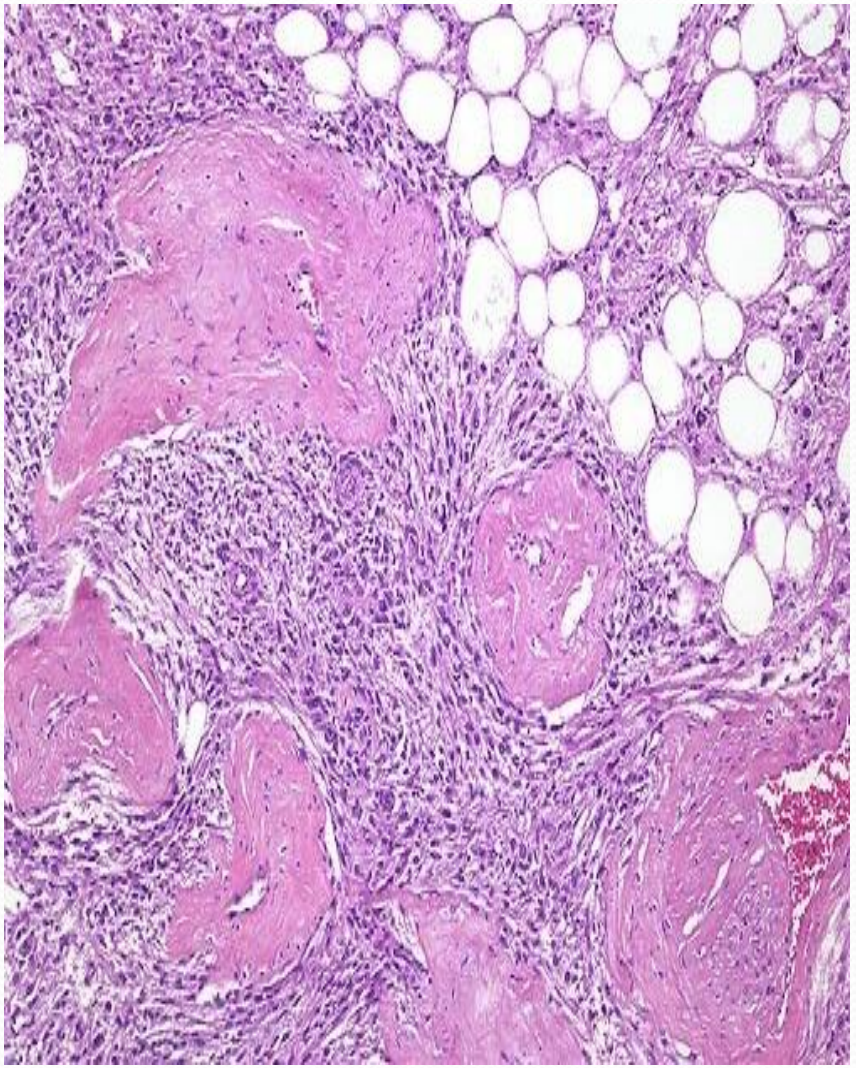


# Angiomyolipoma

- *Rare neoplasm*
- *Associated with Tuberous sclerosis (25-50%pts)*
- *Composed of Benign adipose tissue, Smooth muscle and Sclerotic vessels.*
- *Susceptible to spontaneous hemorrhage.*

# Angiomyolipoma

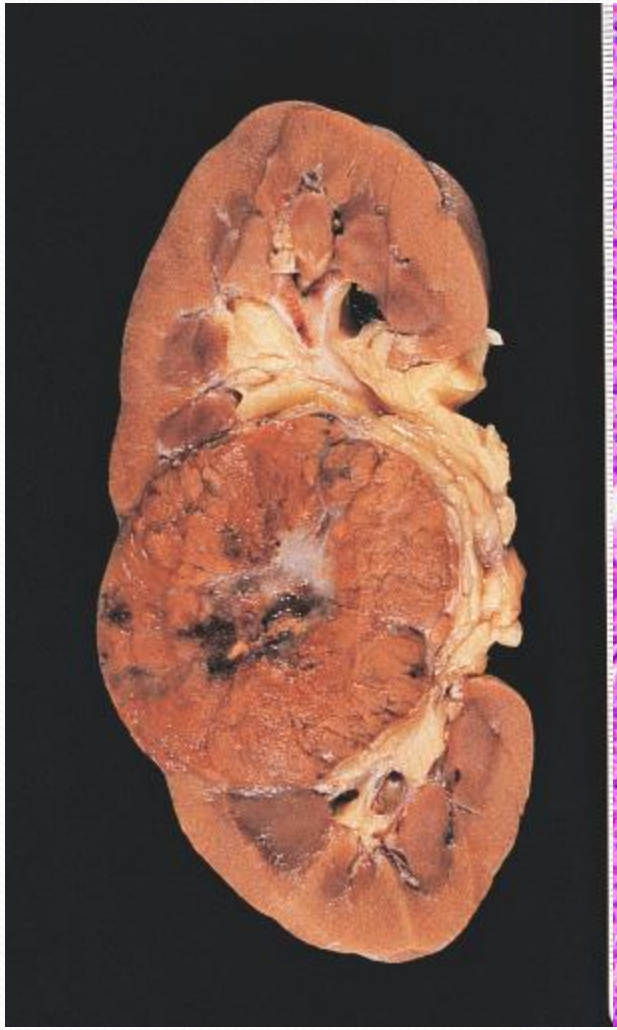


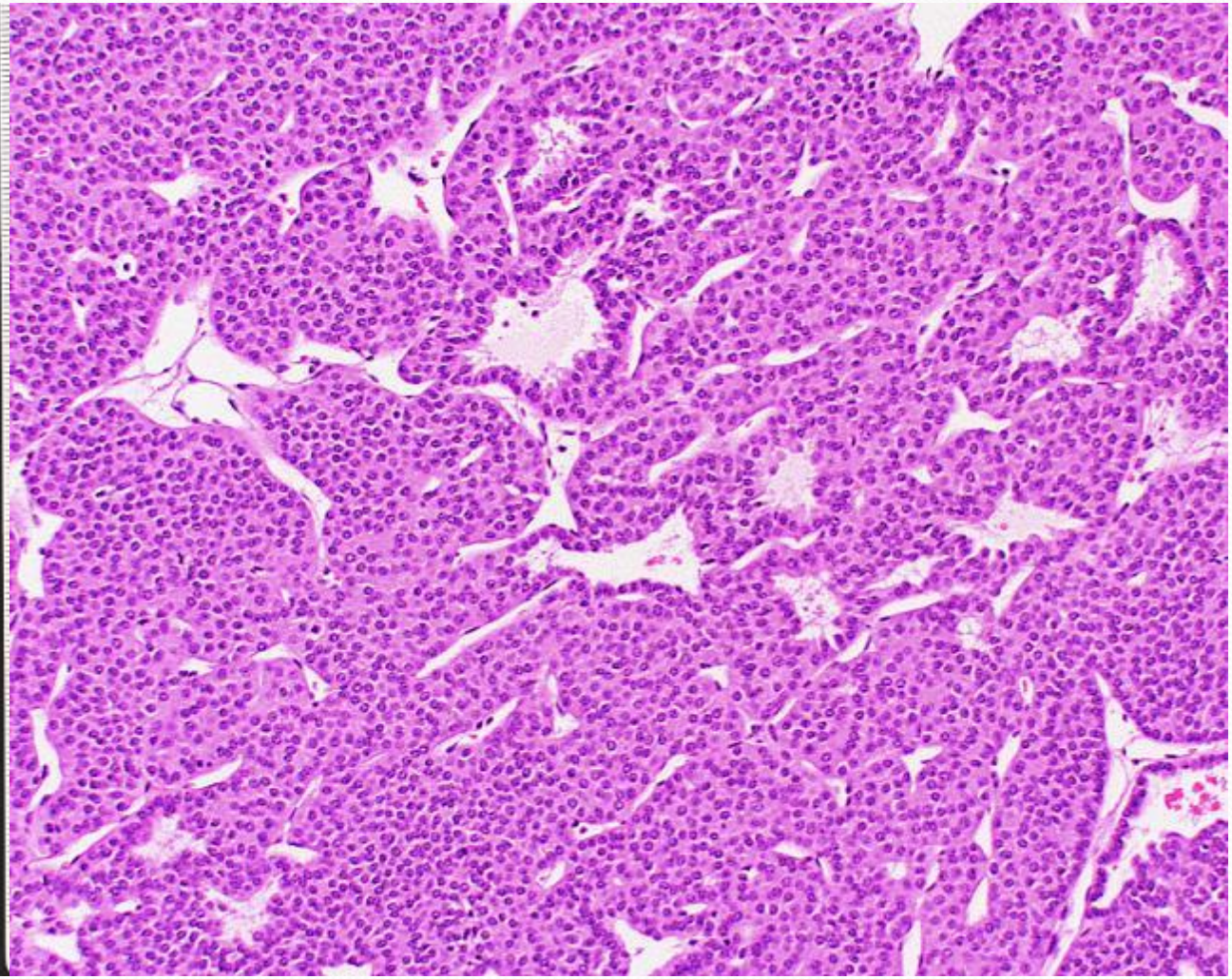



# Oncocytoma

- ***Benign neoplasm arising from intercalated cells of collecting ducts.***
- ***Ultra- structurally the eosinophilic cells have numerous mitochondria.***
- ***Gross: well circumscribed. c/s "Mahogany Brown" color with central stellate scar***
- ***M/E : Large eosinophilic cells having small, round nuclei, large nucleoli***

# Oncocytoma





# Renal Cell Carcinoma

- ***Also termed Hypernephroma, Clear cell carcinoma of kidney, Adenocarcinoma of kidney, Grawitz tumor.***
- ***Comprises 70- 80% of all renal cancers.***
- ***Origin from renal tubular epithelium.***
- ***60-70 years of age***
- ***M:F = 2:1***

# Renal Cell Carcinoma

***Risk factors:***

- ***Tobacco, cigarette smoking***
- ***Obesity, HTN***
- ***Unopposed estrogen therapy***
- ***Exposure to asbestos, petroleum products, heavy metals***
- ***Acquired cystic ds, Tuberous sclerosis***

# Renal Cell Carcinoma

- Renal cancer : Sporadic (common)
  Familial (only 4%)
- Familial cancers occur in a younger age group
- Various familial variants are

1. Von Hippel Lindau syndrome(VHL)–develop Hemangioblastomas, Renal cysts & B/L,multiple RCC.
   - VHL gene is implicated in the development of both familial and sporadic clear cell tumors
2. Hereditary/familial clear cell CA
3. Hereditary papillary CA: Multiple B/L Papillary RCC

- In 98% tumors deletion seen in short arm Of Chr. 3

# Renal Cell Carcinoma

***Clinical Features***

***Classic triad of symptoms*: seen in 10% cases only**

1. **Costo-vertebral angle pain**
2. **Palpable abdominal mass**
3. **Painless Hematuria (M/C of the three)**

***Paraneoplastic syndrome:***

- **Polycythemia (erythropoietin), Hypercalcemia,**
- **Hypertension, Cushing syndrome,**
- **Feminization or Masculinization,**
- **Eosinophilia, leukemoid rxn and amyloidosis**
- **Metastases to lung, bone followed by LN, liver, adrenal and brain.**

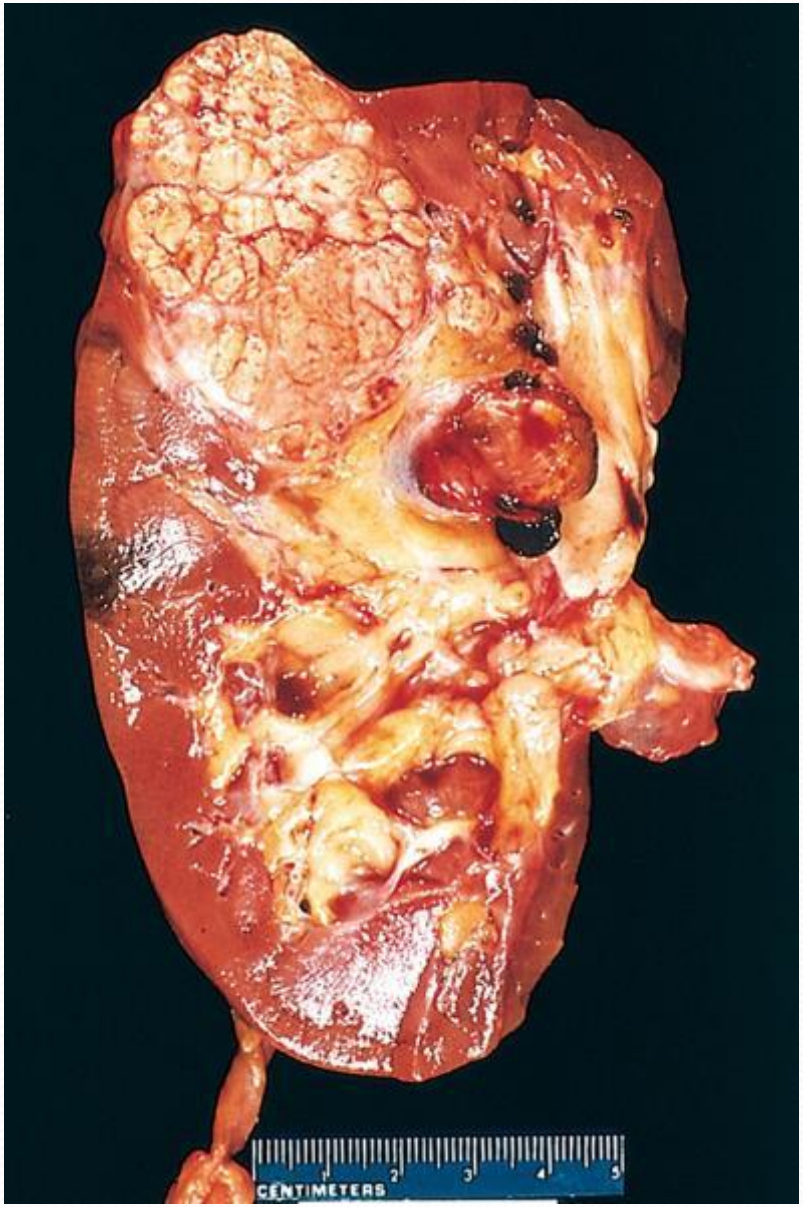
# Renal Cell Carcinoma

- ***Conventional RCC (Clear cell): 70-80%***
- ***Papillary Carcinoma: 10-15%***
- ***Chromophobe Carcinoma: 5%***
- ***Collecting duct Carcinoma: 1%***

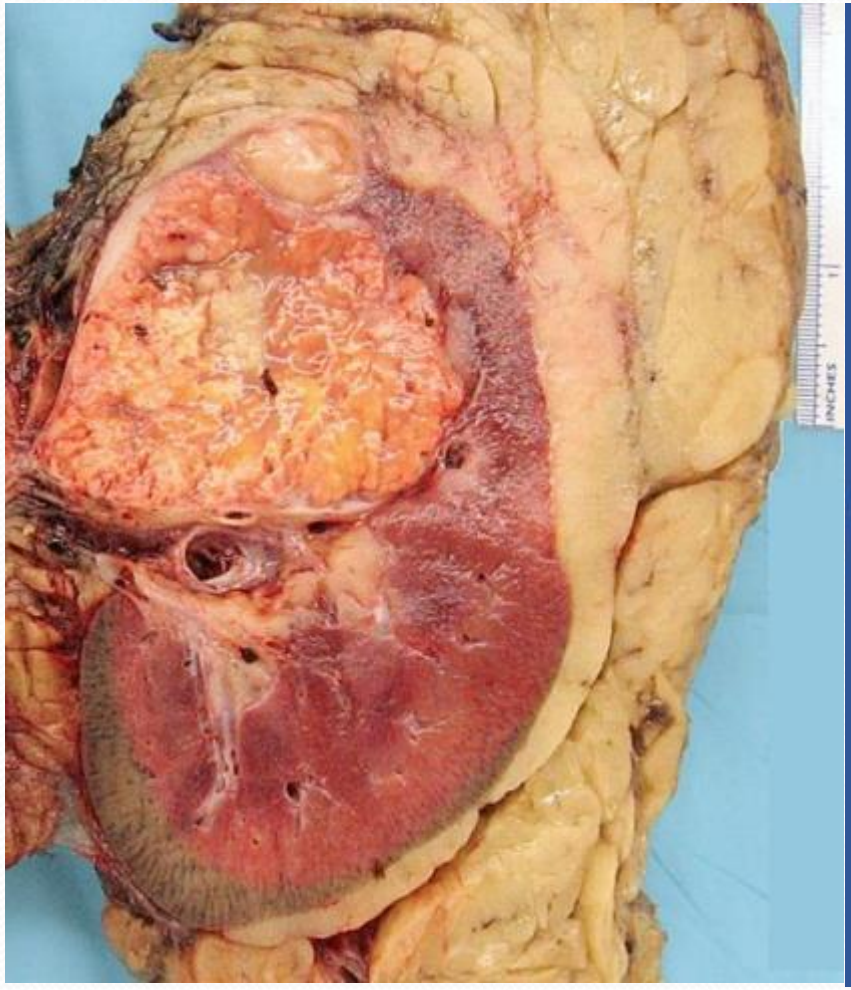
# Conventional RCC

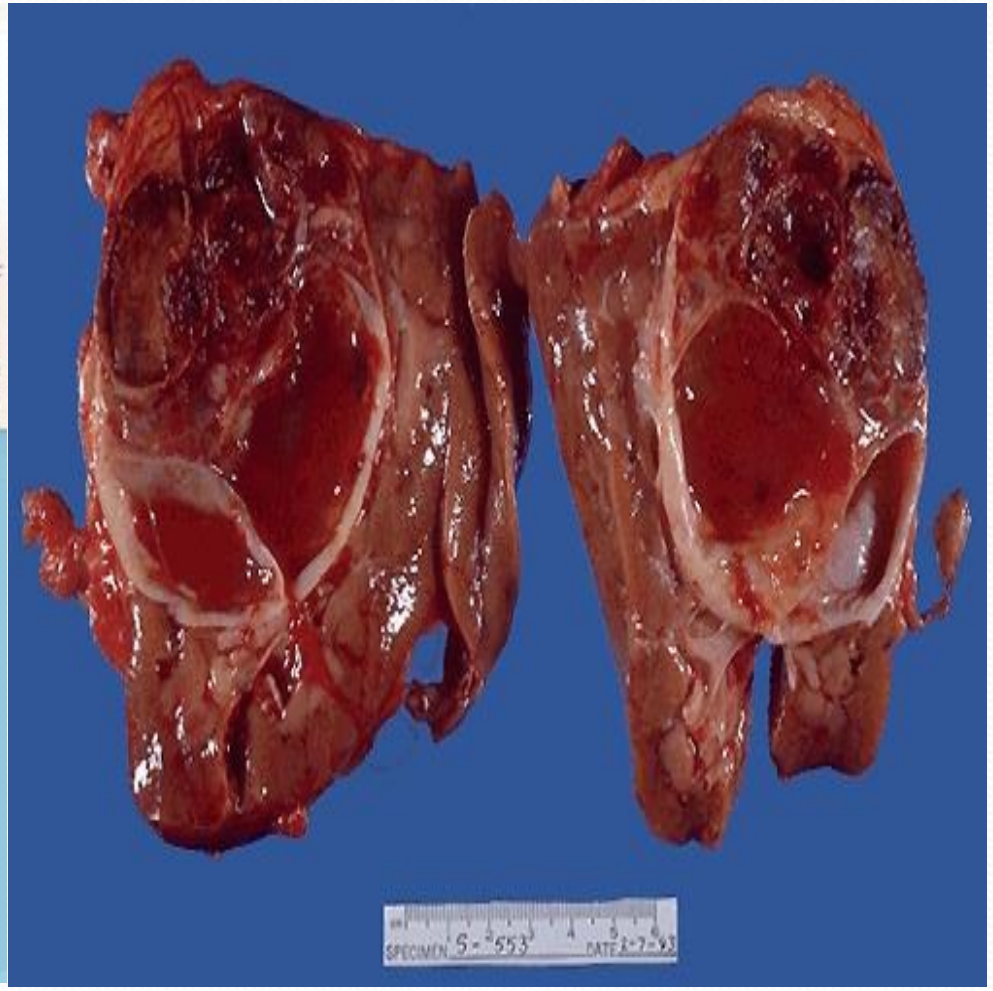
***Gross:***

- ***Solitary, U/L, large tumor arising in the cortex***
- ***M/C at the poles***
- ***Yellow orange to gray white (lipid)***
- ***Areas of cystic change/haemorrhage***
- ***May invade the renal vein- further grow in the inferior venacava- right side of heart***



# Conventional RCC



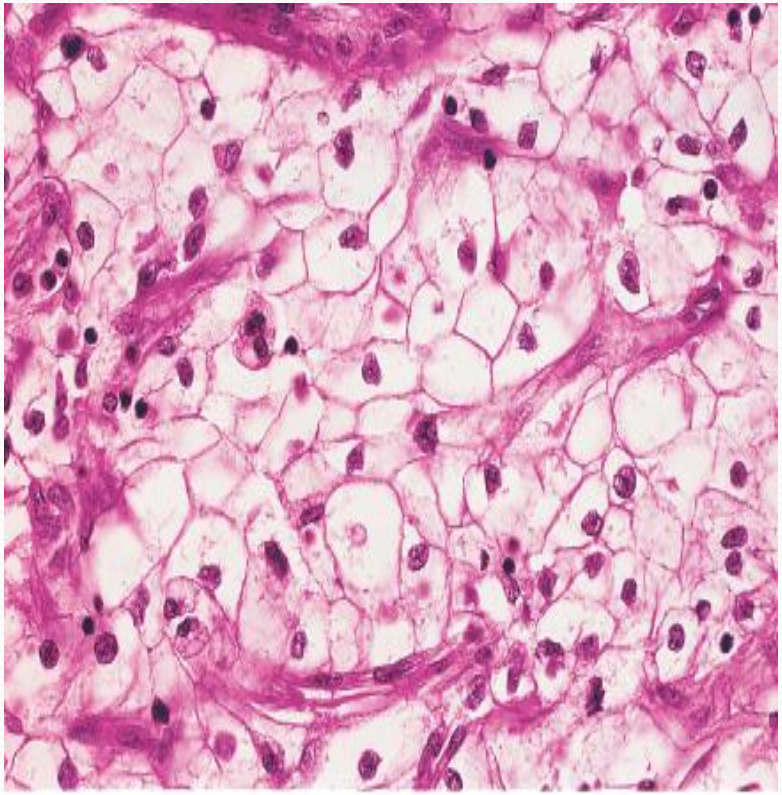


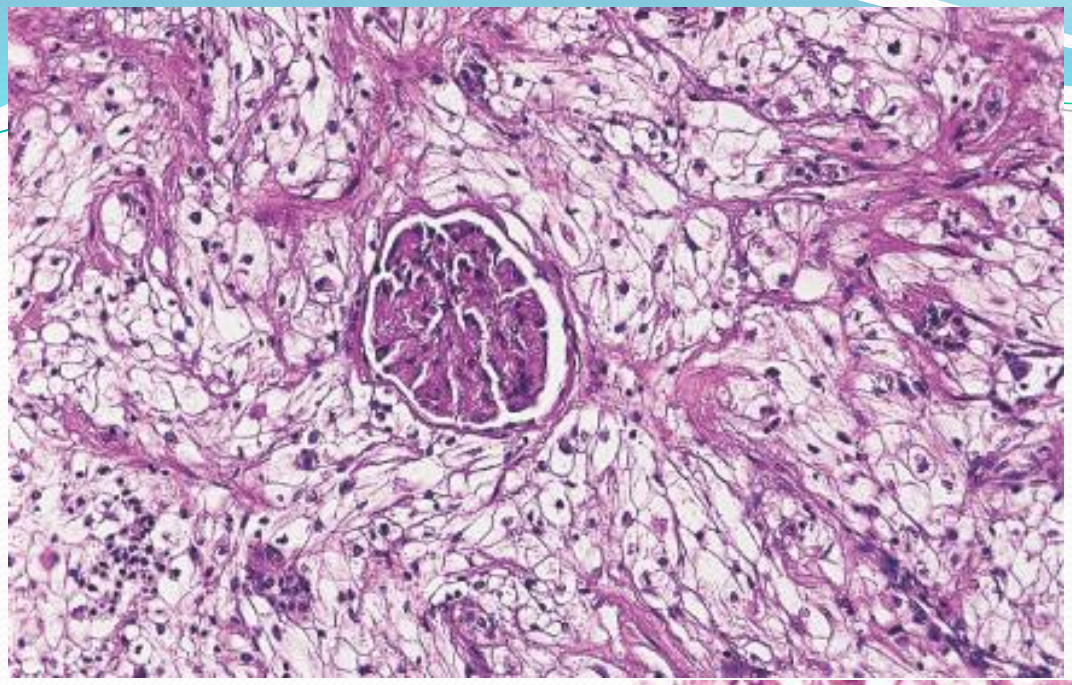
# Conventional RCC

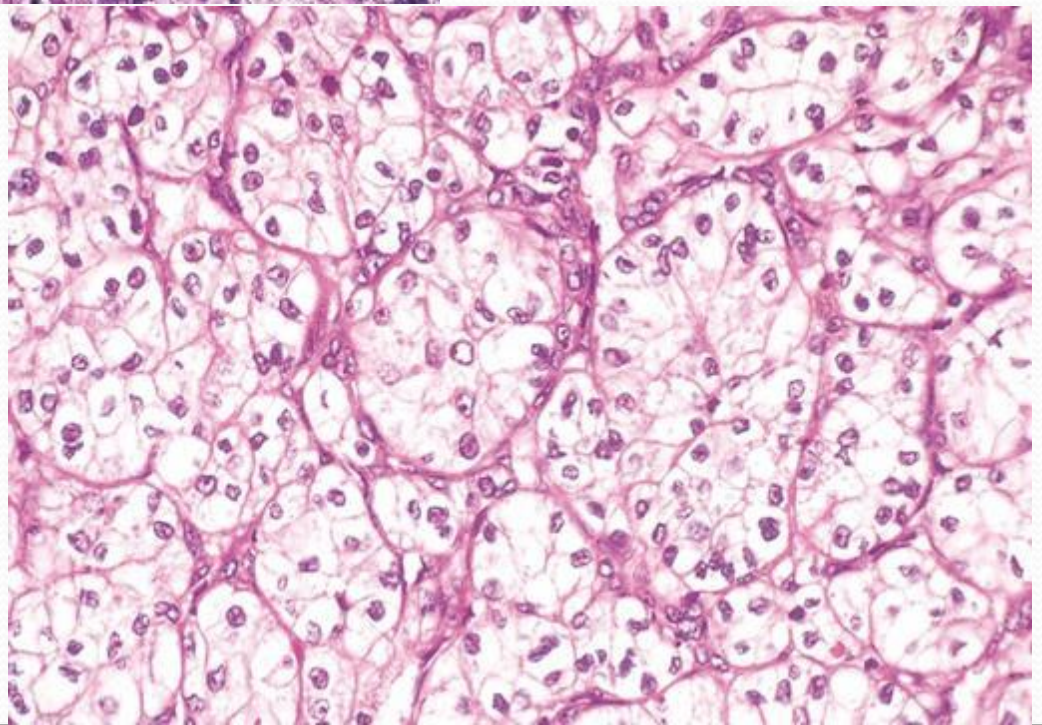
***M/E:***

***Most common pattern: Clear cell type***

- ***Tumor cells polygonal with abundant clear cytoplasm, arranged in nests and sheets, delicate fibrovascular network***
- ***Cells often contain lipid and/or glycogen***
- ***Cell may be : granular and eosinophilic***
- ***Often bland nuclear features, except for high-grade anaplastic variants***





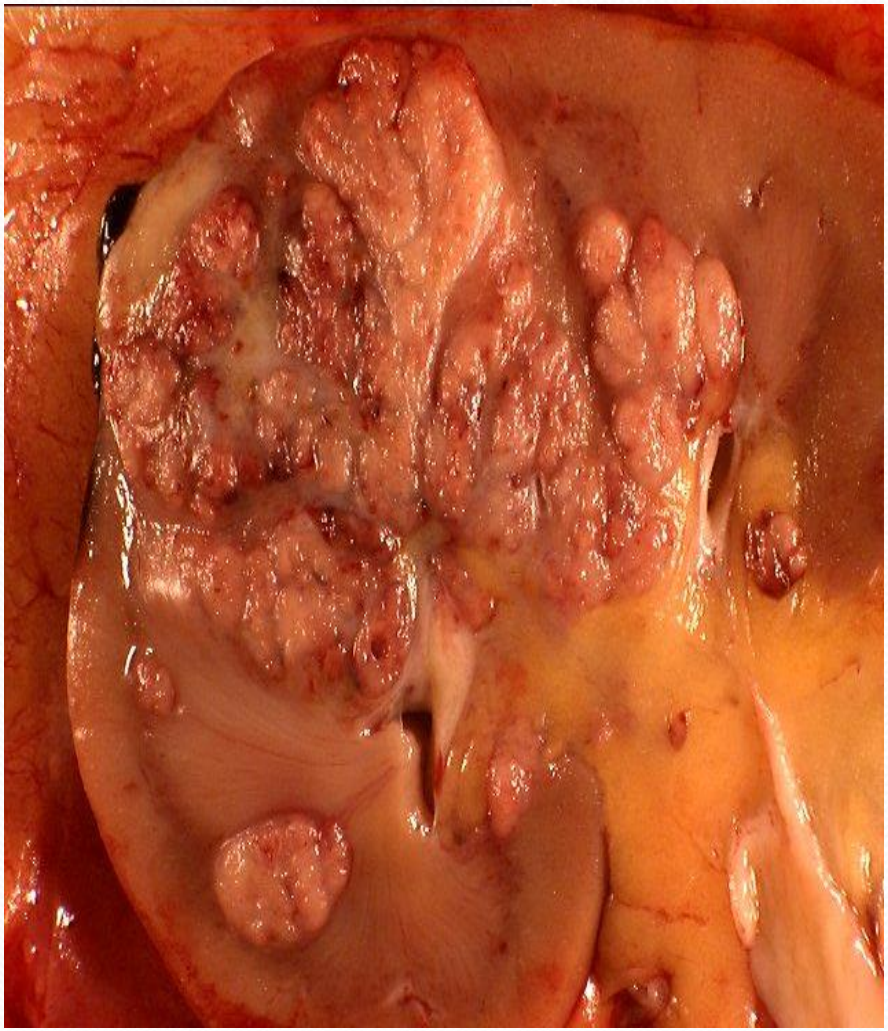


# Papillary RCC

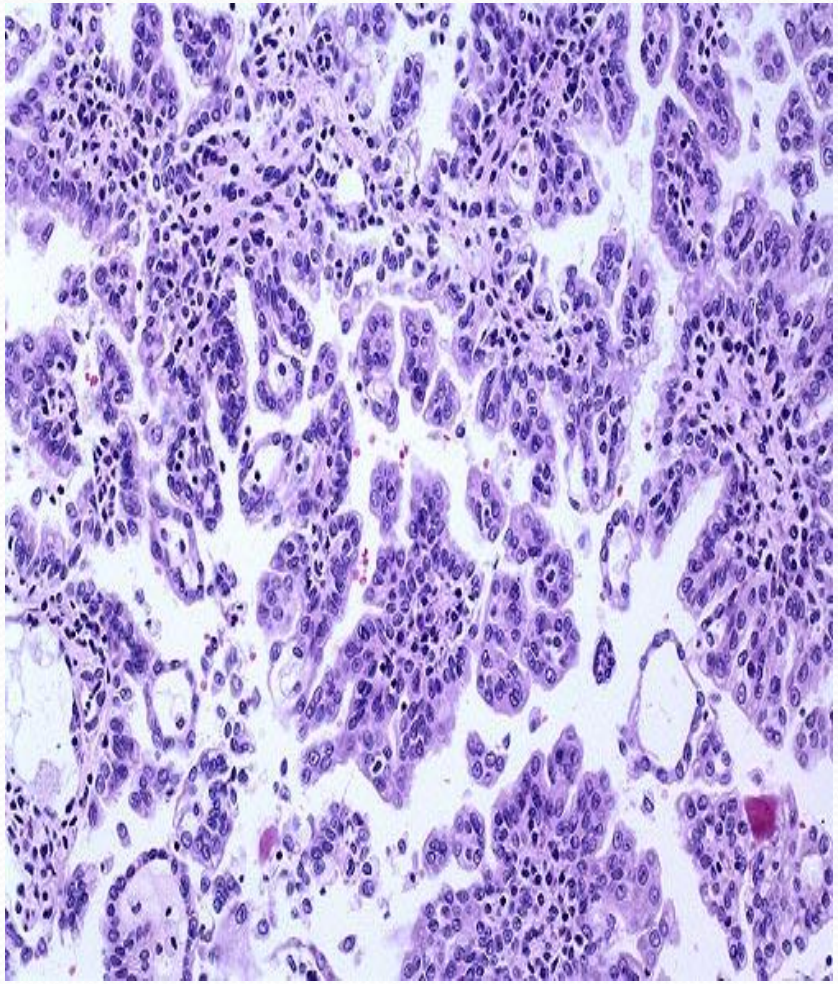
- *10-15% of renal cancers*
- *Characterized by papillary growth pattern*
- *Multifocal, bilateral*
- *Familial and sporadic*
- *M/E- Cuboidal / low columnar cells lining papillae. Interstitial foam cells common in papillary cores.*
- *Not associated with 3p deletions*
- *In Familial cases: Trisomy 7*
- *In Sporadic cases: trisomy 7, 16, 17 and loss of Y.*
- *M/C type in patients of Dialysis associated cystic ds.*

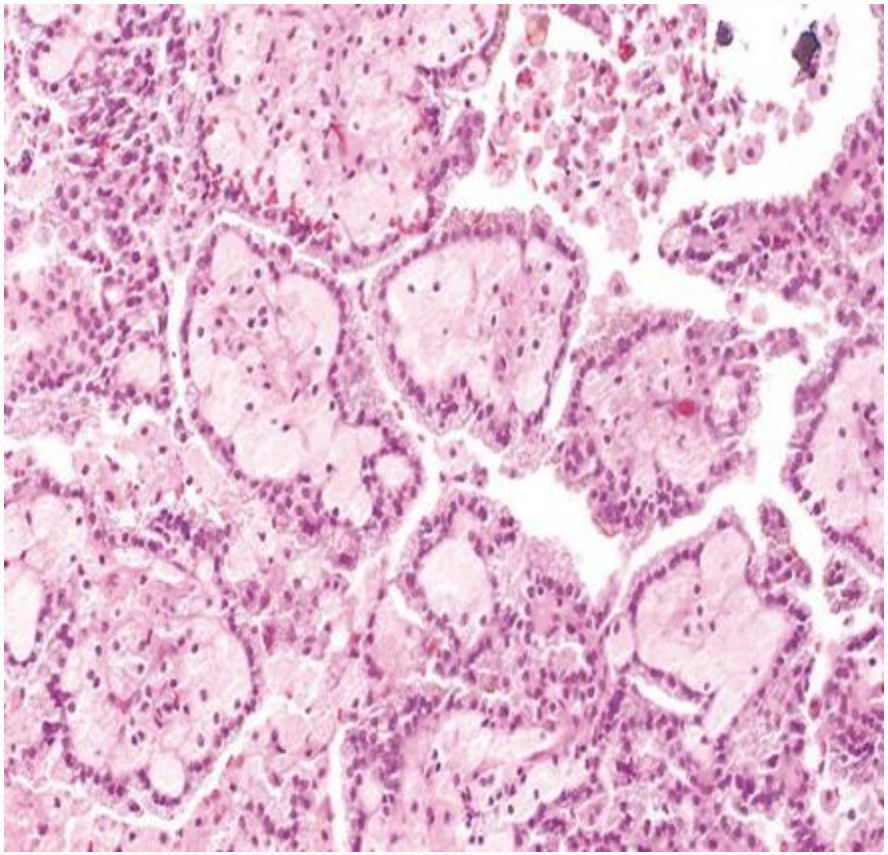
# Papillary RCC

- ***Gross:***
  ***Thought to arise from distal convoluted tubules***
  ***Multifocal***
  ***Bilateral.***
  ***They are typically hemorrhagic and cystic, especially when large.***



# Papillary RCC

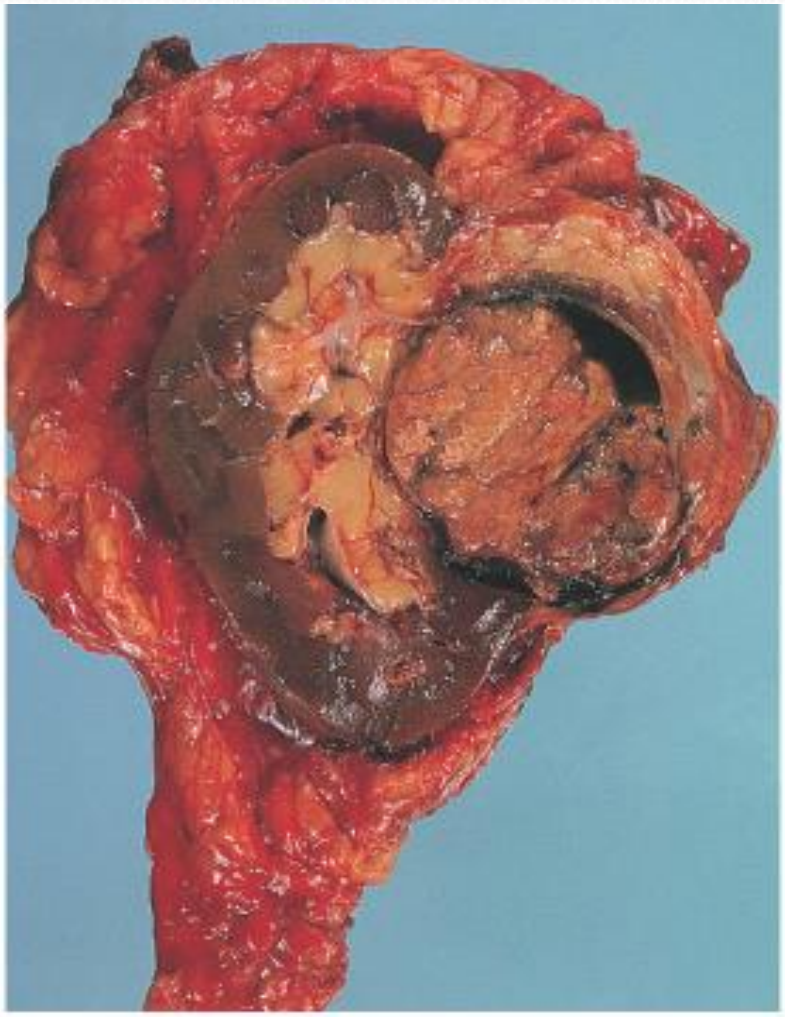


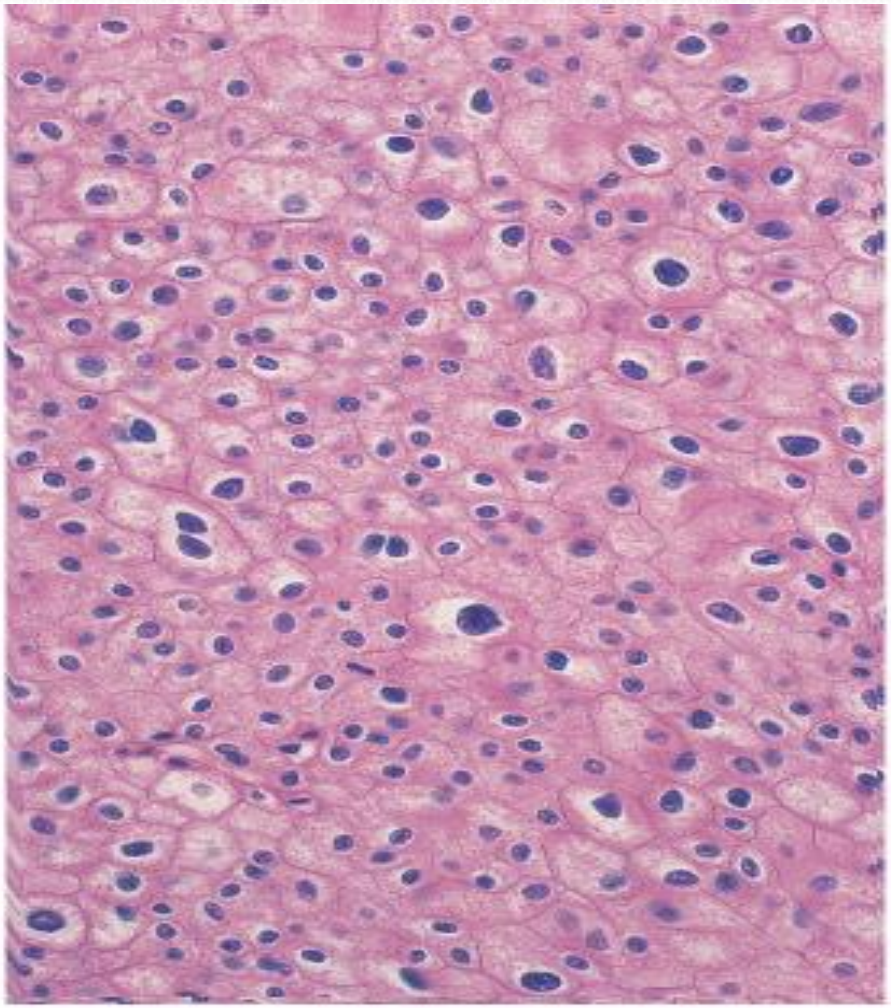


# Chromophobe RCC

- *5% of renal cell cancers, arise from collecting ducts*
- *Cells with prominent cell membranes and pale eosinophilic cytoplasm, perinuclear halo.*
- *D/D: Oncocytoma.*
- *Show multiple chromosome losses & hypodiploidy.*
- *Excellent prognosis*

# Chromophobe RCC



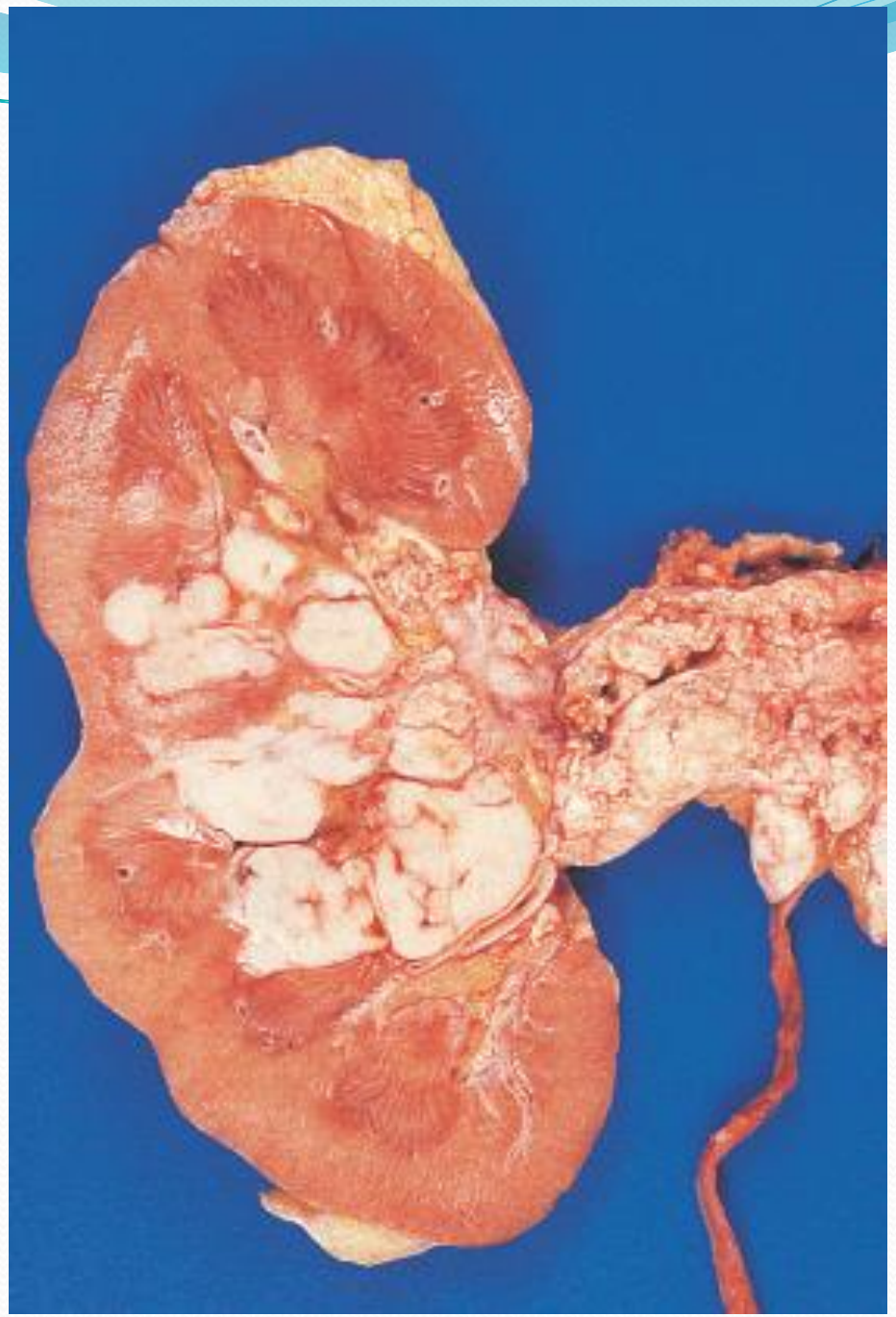


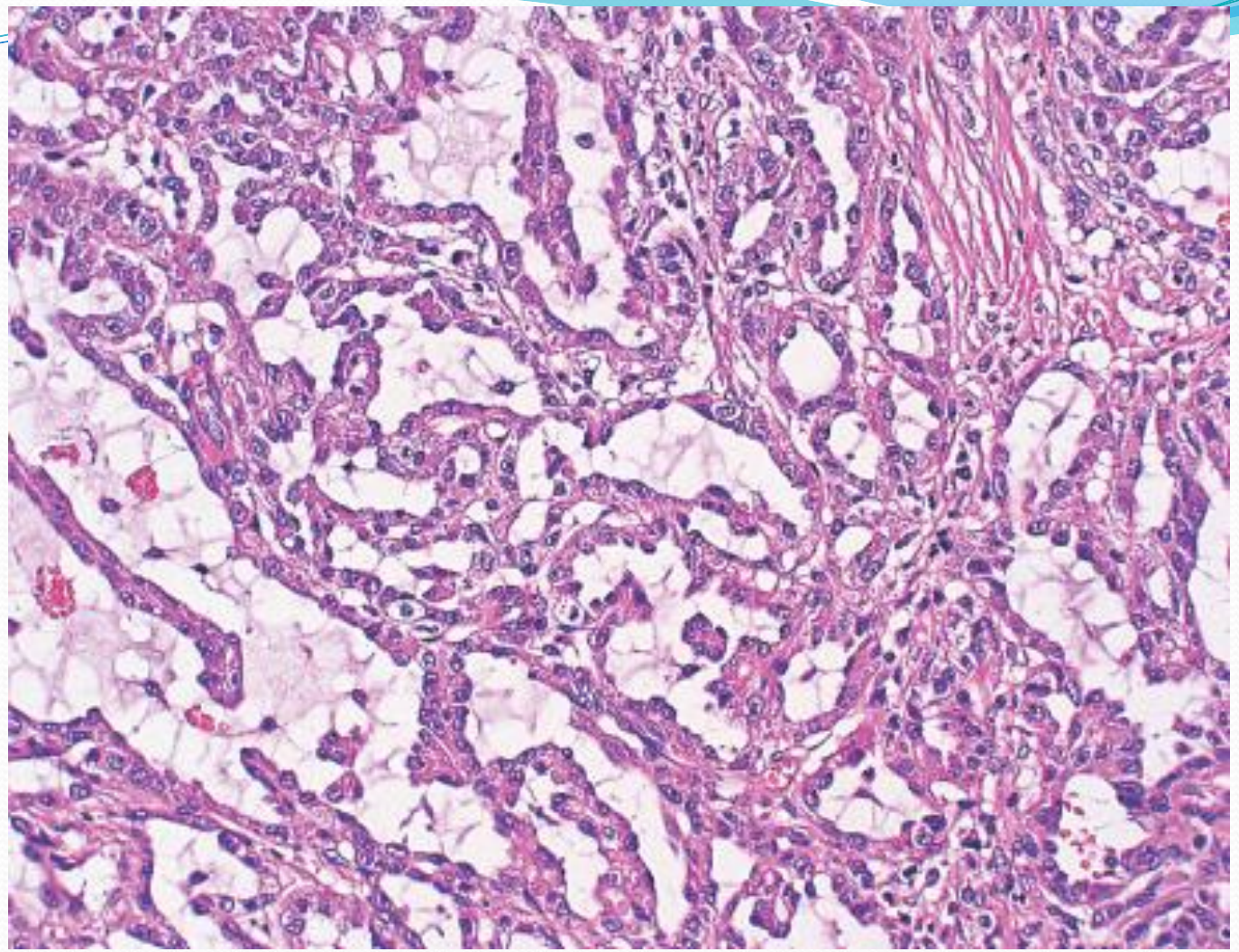
# *Collecting Duct / Bellini Duct Ca*

- ***A malignant epithelial tumor, derived from the collecting duct cells in the medulla.***
- ***Rare (<1% of all RCC).***
- ***Hematuria – most common clinical feature.***

***Gross:***

- ***Centered in medulla***
- ***Unifocal, solid, tan white***
- ***Firm ,***
- ***Poorly circumscribed,***
- ***often extend into renal sinus & hilar fat***





***M/E**: Irregular channels lined by highly atypical epithelium with a hobnail pattern*

# Wilms tumor

- Most common malignant renal tumor of children (generally 2-5 years old)
- Malignancy of primitive renal blastema, with epithelial and stromal components
- Usually presents as abdominal mass
- One of the three intra-abdominal malignancies of infancy/childhood:
  - Wilms (nephroblastoma) of kidney
  - Hepatoblastoma of liver
  - Neuroblastoma of adrenal

# Wilms tumor

***Clinical Features:***

- ***Most commonly present with large abdominal mass***
- ***Hematuria, Pain in abdomen, Hypertension***
- ***Some may present with pulmonary metastasis.***
- ***In 10% cases Wilms tumor arise in the setting of various syndromes***
- ***WAGR syndrome:***
  - ***Wilms tumor.***
  - ***Aniridia***
  - ***Genital anomalies***
  - ***Mental retardation)***
- ***33% chance of developing Wilms tumor.***
- ***Chromosome 11p13: WT1 & PAX6 gene***

# *Wilms tumor*

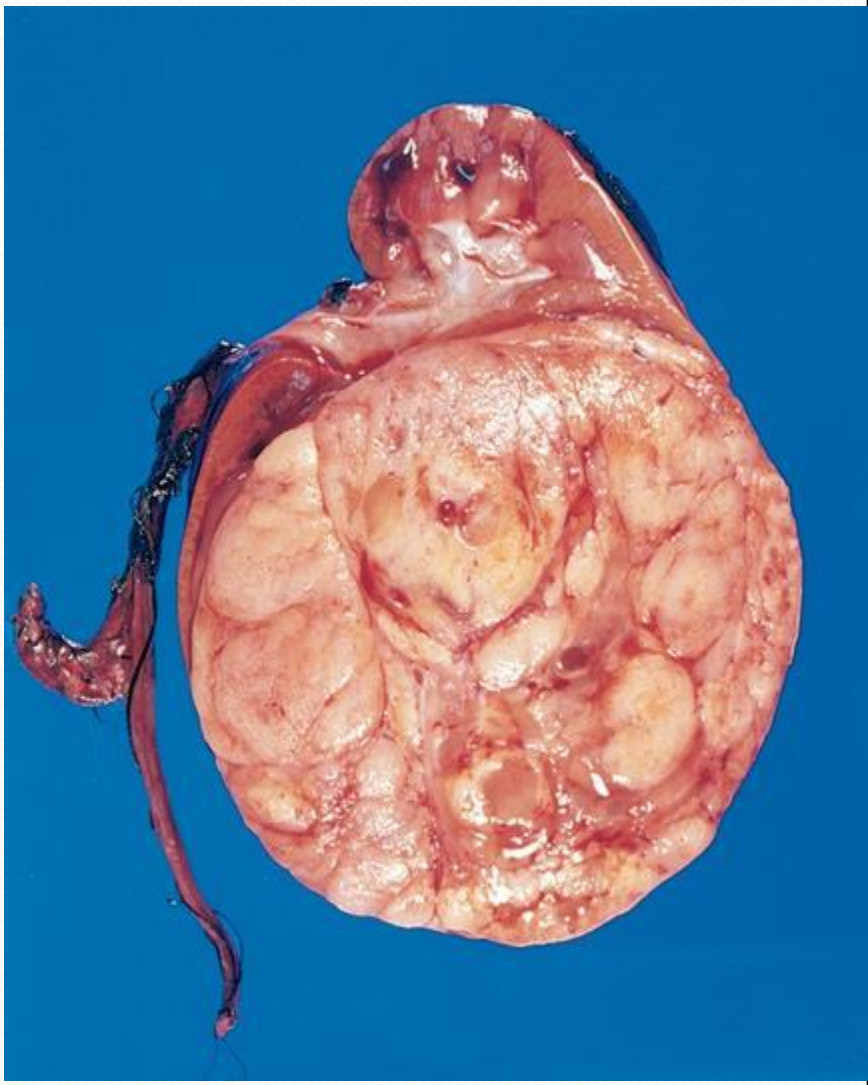
- ***Denys Drash syndrome:***
  - ***Wilms tumor***
  - ***Gonadal dysgenesis (male psudohermaphriditism)***
  - ***Early onset nephropathy (Diffuse mesangial sclerosis)***
- ***90% chances of developing Wilms tumor.***
- ***Germline mutation in WT1 gene.***
- ***Increased risk of developing Gonadoblastoma.***

# Wilms tumor

- ***Beckwith –Wiedemann Syndrome (BWS):***
  - ***Wilms tumor***
  - ***Organomegaly***
  - ***Macroglossia***
  - ***Hemihypertrophy***
  - ***Omphalocele***
  - ***Adrenal cytomegaly.***
- ***Chr 11p15.5: WT2 gene.***
- ***Increased risk of Hepatoblastoma, Pancreatoblastoma, Adrenocortical tumors & Rhabdomyosarcoma.***

# Wilms tumor

- ***Gross*:**
- ***Involve both kidneys either simultaneously(Synchronous) or one after the other (Metachronous).***
- ***Large, Solitary well circumscribed mass.***
- ***C/S: Tan to gray, soft, homogenous with foci of hemorrhage & necrosis & cyst formation.***

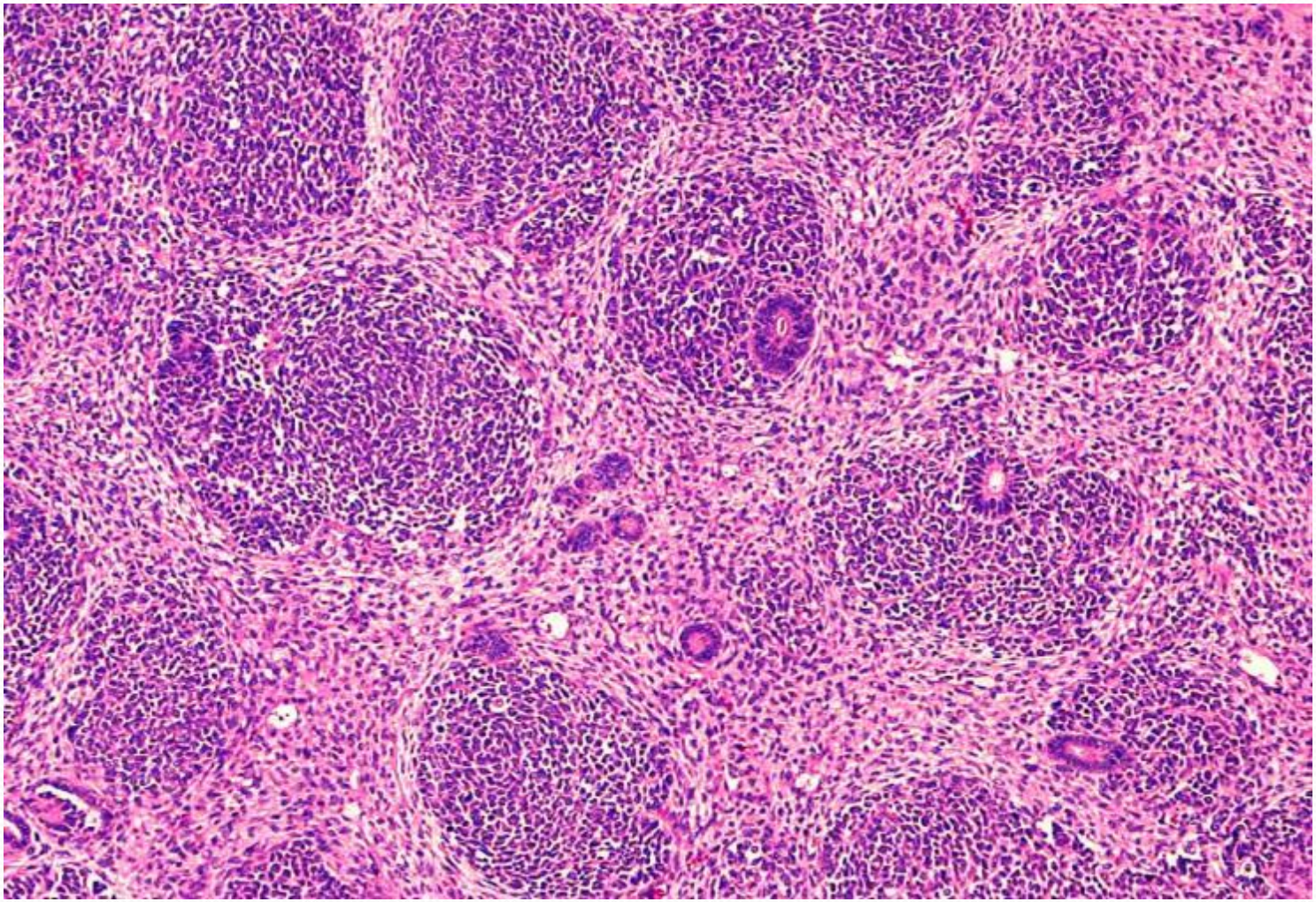


# Wilms tumor

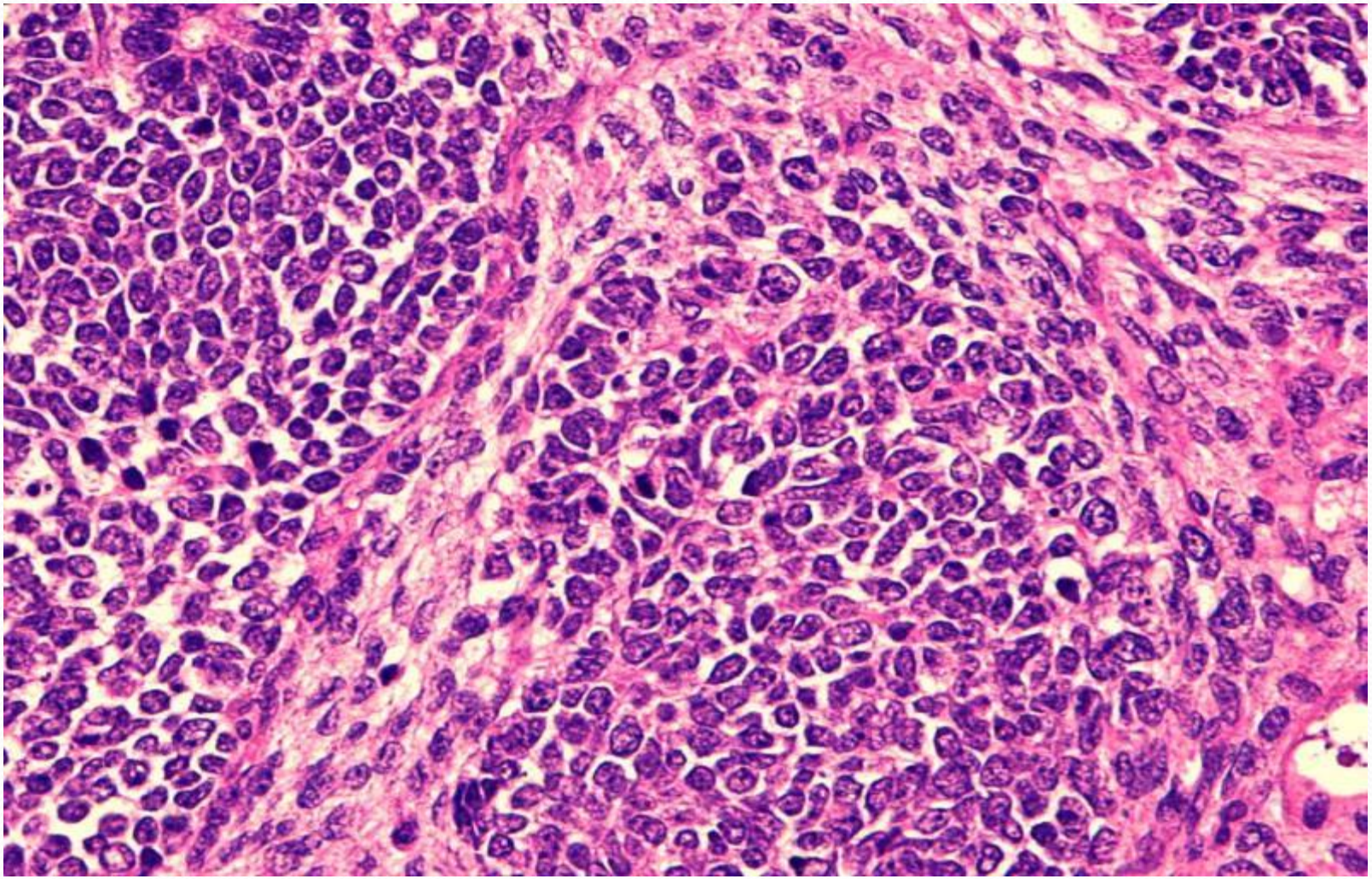
***Triphasic pattern***

- ***Primitive blastemal component:*** ***sheets of small, dark blue cells***
- ***Epithelial component:*** ***abortive tubules and glomeruli***
- ***Stromal component:*** ***Fibrous or myxoid, sometimes heterologous mesenchymal elements (cartilage, muscle, bone, adipose tissue etc.)***
- ***Anaplasia*** ***seen in 5% of tumors***

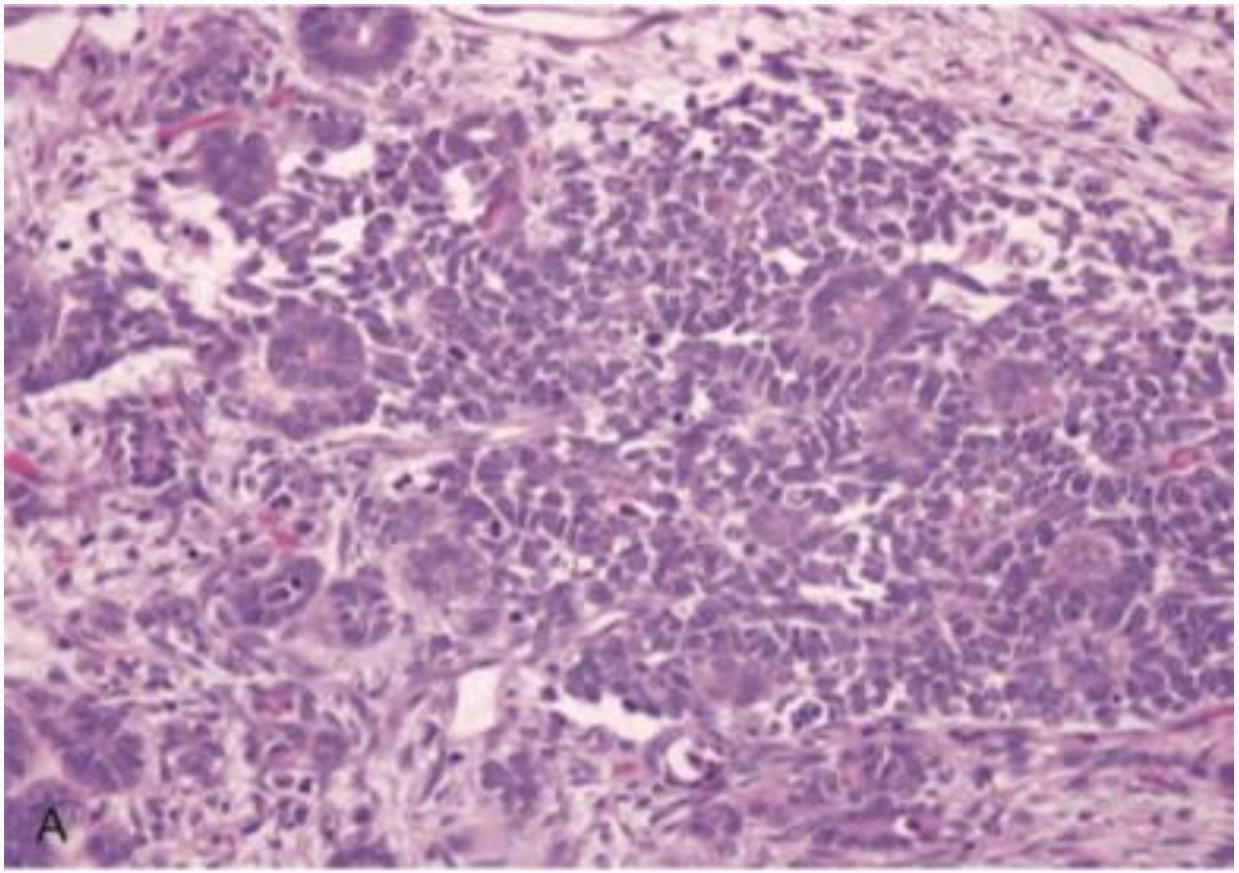
# Wilms tumor



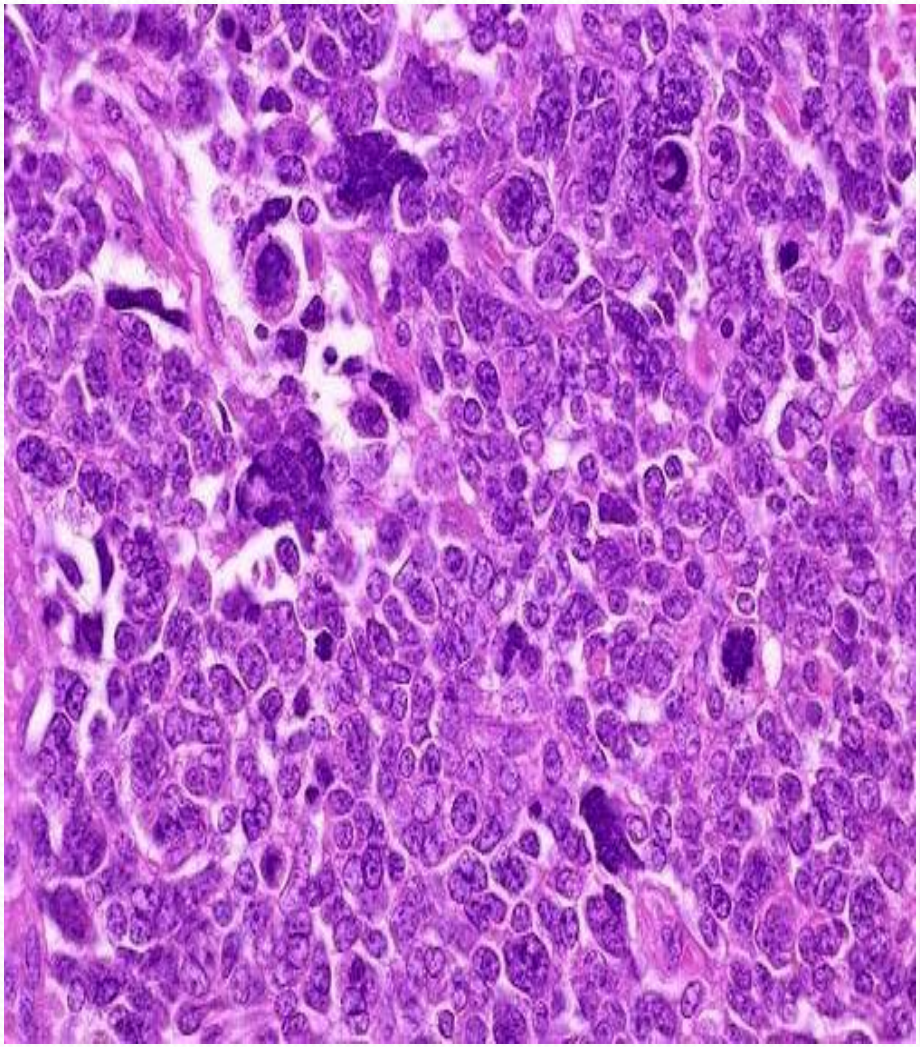
# Wilms tumor

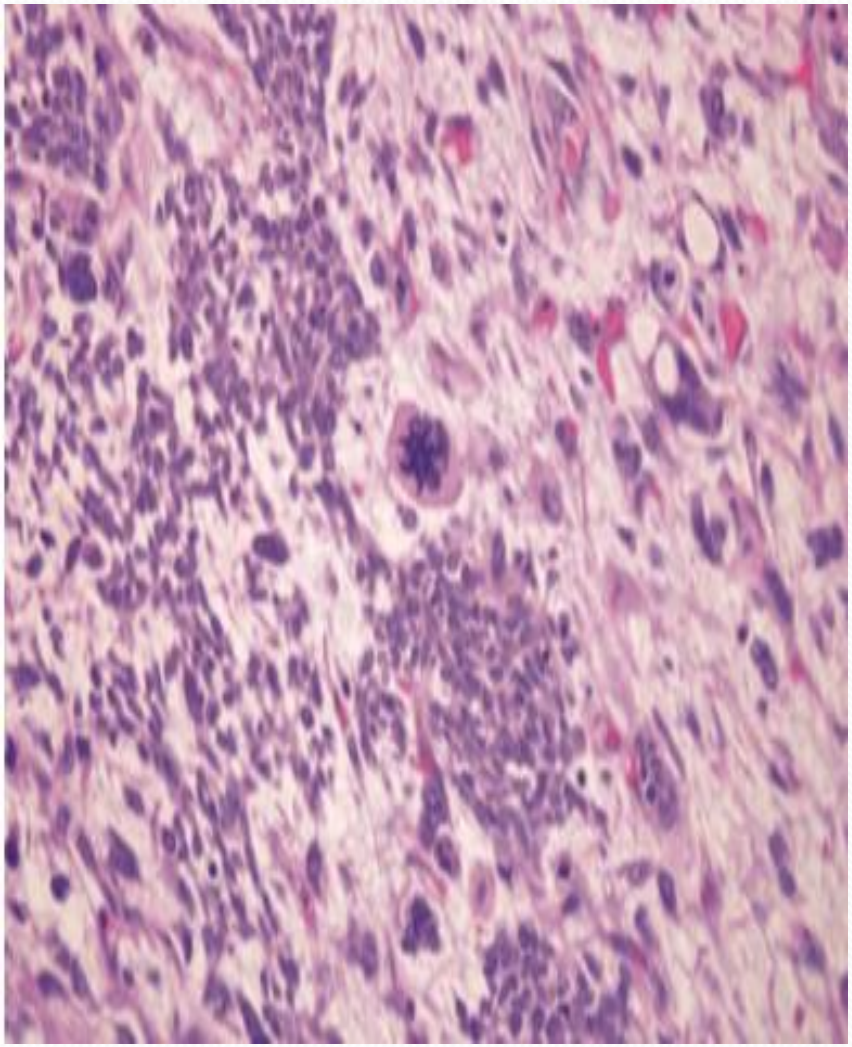


# Wilms tumor



# Wilms tumor





# Wilms tumor

- ***Prognosis:***
  - ***Anaplasia of tumor cells (Pleomorphism, hyperchromatism, abnormal mitoses) correlates with more aggressive biologic behavior***
  - ***Stage of tumor at time of resection important***
- ***Treatment:***
  - ***Combined surgical, radiation therapy and chemotherapy has improved survival***

# Wilms tumor

- ***Malignancy can be cured but increased risk of developing Second primary tumors:***
  - ***Bone and soft tissue sarcomas***
  - ***Leukemia***
  - ***Lymphomas and***
  - ***Breast cancers***
- ***Maybe due to germline mutation in a cancer predisposition gene or as a consequence of radiation therapy***

# *Definitions*

- Azotemia – biochemical abnormality caused by reduction of the GFR which results in the elevations of blood urea nitrogen ( BUN) and creatinine
- Uremia ( azotemia + clinical symptoms and sings ).

# Uremia (Sign and symptoms)

| Signs and Symptoms of Uremia | |
|---|---|
| **System** | **Manifestation** |
| General | Nausea, anorexia, malaise, Chronic dermatitis |
| Neurologic | Muscle weakness, Functional neuropathy<br>Encephalopathy (change in mental status, ↓ memory & attention) |
| Cardiovascular | CHF, HTN, Uremic Pericarditis. |
| Hematologic | Anemia, bleeding (due to platelet dysfunction) |
| Metabolic | ↑BUN, ↑ Cr, ↑K, ↑$PO_4$, acidosis, ↓Ca, 2° hyperparathyroidism. |

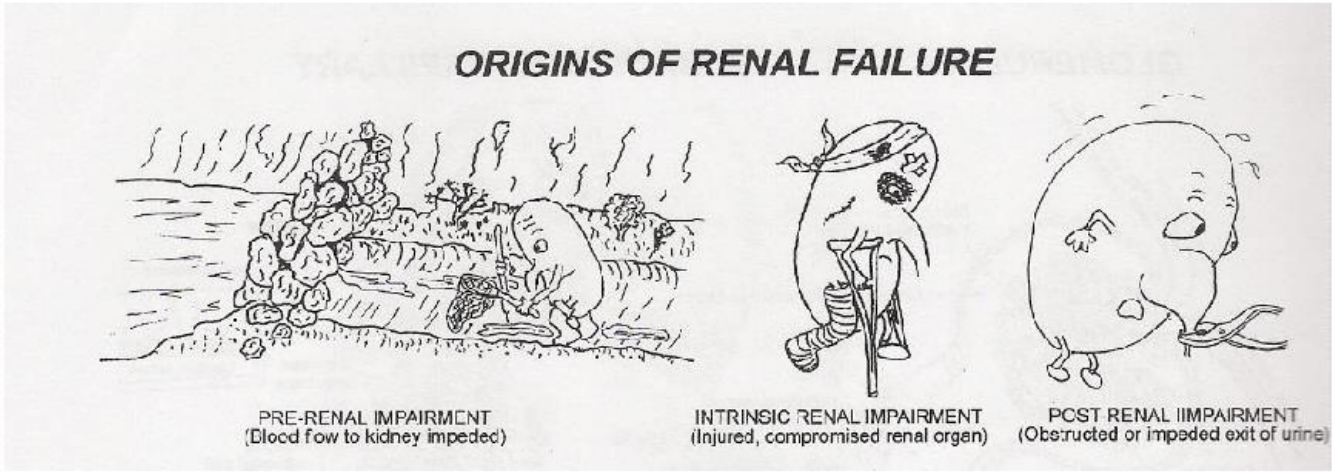
# Acute Renal Failure

- Oligouria
- Anuria
- Acute onset of azotemia

# Acute Renal Failure

## Acute Renal Failure

- Pre-renal causes
- Intrinsic causes
- Post-renal causes



# Pre Renal Causes

- Pre-renal causes :
  - Decreased cardiac output
  - Diminished intravascular volume ( hypovolemia )
    - Road traffic accident
    - Internal bleeding
    - Hemorrhage during surgery
    - Sepsis

# Intrinsic Causes

- Glomerular diseases
  - Nephrotic syndrome
  - Nephritic syndrome
- Tubular diseases
- Interstitial diseases
- Vascular diseases

# Post-renal Causes (Obstructive Uropathy)

- intra/extraureteric obstruction
- Lower urinary tract obstruction

# Chronic Renal Failure

- It results from gradual but progressive loss of normal renal function
- It occurs in four steps

# Chronic Renal Failure (CRF)

1

**Diminished Renal Reserved**

- GFR is close to 50% of normal
- BUN and Creatinine : normal
- Patient is asymptomatic

2

**Renal Insufficiency**

- GFR is close to 25-50% of normal
- Azotemia starts to appear
- Patient is symptomatic
  - Polyuria
  - Nocturia

3

**Renal Failure**

- GFR <20%
- Uremia ( Azotemia + Multisystem clinical signs and symptoms of renal failure

4

**End-Stage Renal Disease**

- GFR is less than 5%
- Major cause of death