

Diseases of Urinary System

(Part 1)

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Pathology of urinary tract diseases

Intended Learning objectives

By the end of this course; you should:

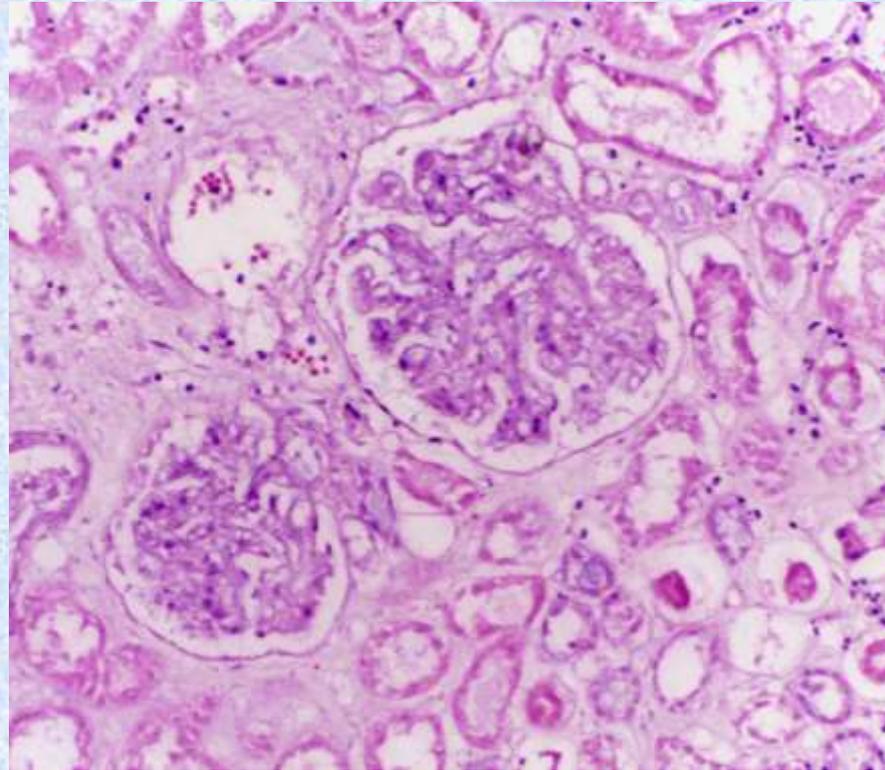
- Enumerate congenital anomalies of kidney
- Know pathological features of polycystic kidney
- Define GN and identify mechanisms of glomerular injury and tissue reaction of this disease
- Differentiate nephrotic from nephritic syndrome and enumerate their causes

Pathology of urinary tract diseases

Main histological components of kidney

Diseases of kidney may involve:

- Renal glomeruli
- Renal tubules
- Renal interstitium
- Renal vessels



In chronic conditions; the four elements are involved

Pathology of urinary tract diseases

Congenital kidney diseases

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Congenital kidney diseases

- 1. Unilateral agenesis**
(absent kidney)
- 2. Hypoplasia (small sized)**
- 3. Horseshoe kidney**
- 4. Ectopic kidney**
- 5. Double ureter**
- 6. Ureteric stricture**
- 7. Aberrant renal artery**
- 8. Polycystic kidney**

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Congenital kidney diseases

Polycystic kidney

Definition:

A hereditary kidney disease characterized by cyst formation and marked renal enlargement

Types:

- Infantile type
- Adults type



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Congenital kidney diseases

Polycystic kidney

Infantile type

- A very rare disease
- Autosomal recessive
- Mutation of *PKHD1* gene on chromosome 6
- Incompatible with life
- Bilateral numerous cortical and medullary cysts
- Congenital hepatic cysts and fibrosis

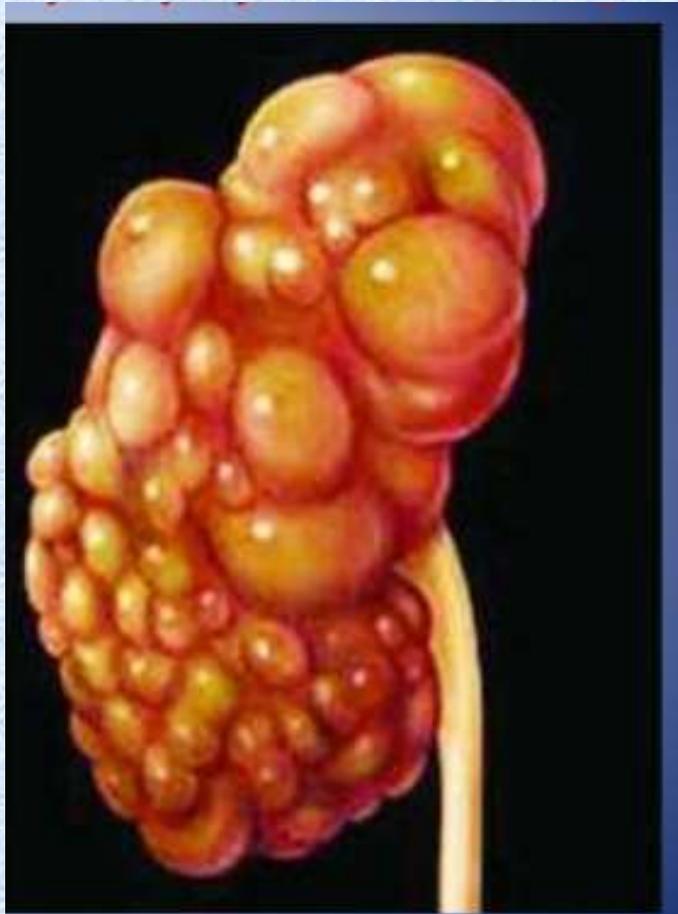
Adult type

- A rare disease
- Autosomal dominant.
- Mutation of *PKD-1* or *2* genes on chromosome 16 or 4
- Failure of communication of convoluted/collecting ducts
- Bilateral numerous large cysts with smooth lining
- Interstitial compression/fibrosis

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Congenital kidney diseases

Polycystic kidney



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Congenital kidney diseases

Polycystic kidney

Presentation:

- Renal mass
- Hematuria
- Hypertension

Complications:

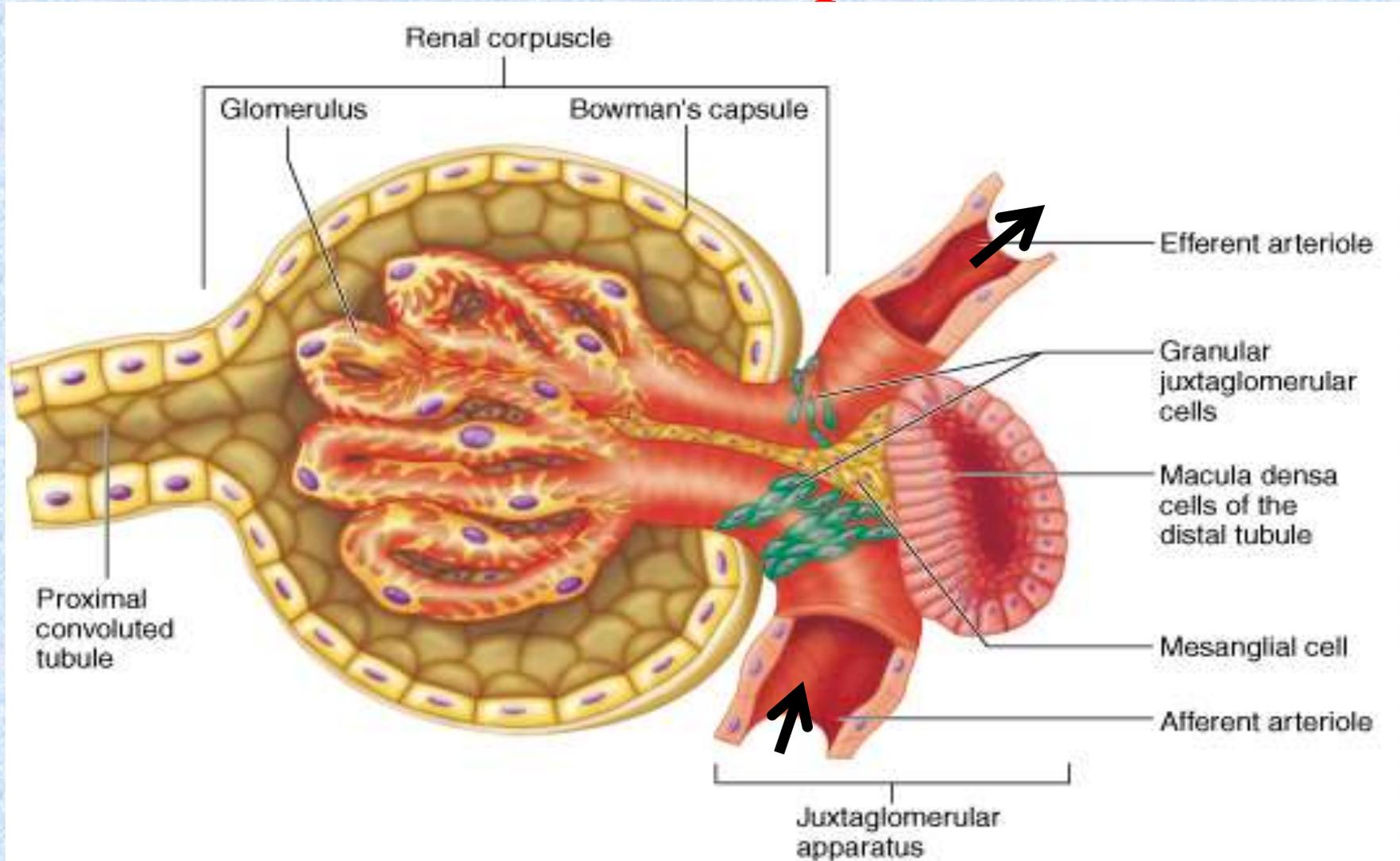
- Secondary infection
- Hypertension
- Renal fibrosis
- Impaired renal function and renal failure

Pathology of urinary tract diseases

Glomerulonephritis

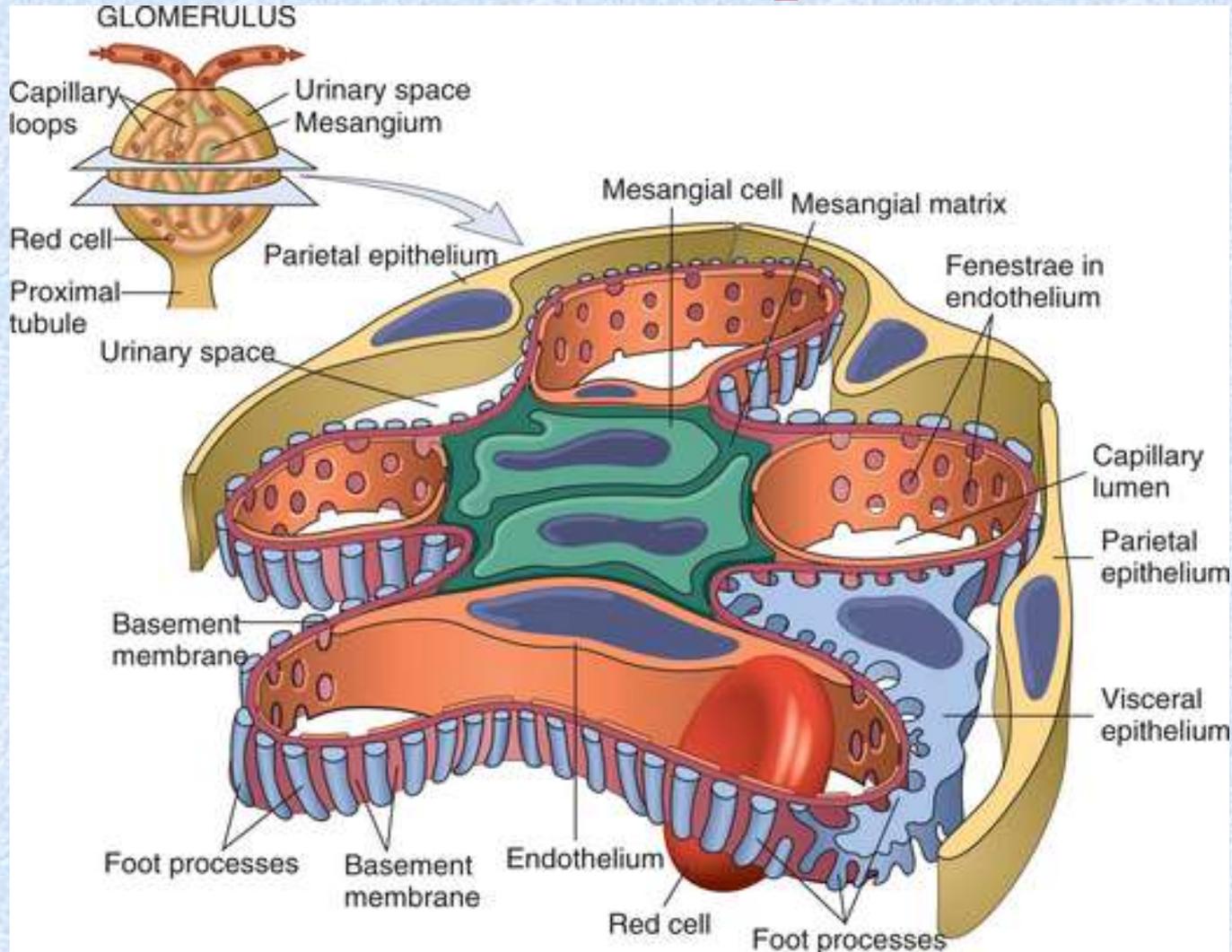
Pathology of urinary tract diseases

Glomerulonephritis



Pathology of urinary tract diseases

Glomerulonephritis



Pathology of urinary tract diseases

Glomerulonephritis

Definition: A heterogeneous inflammatory / immune mediated disease involving mainly glomerular tuft.

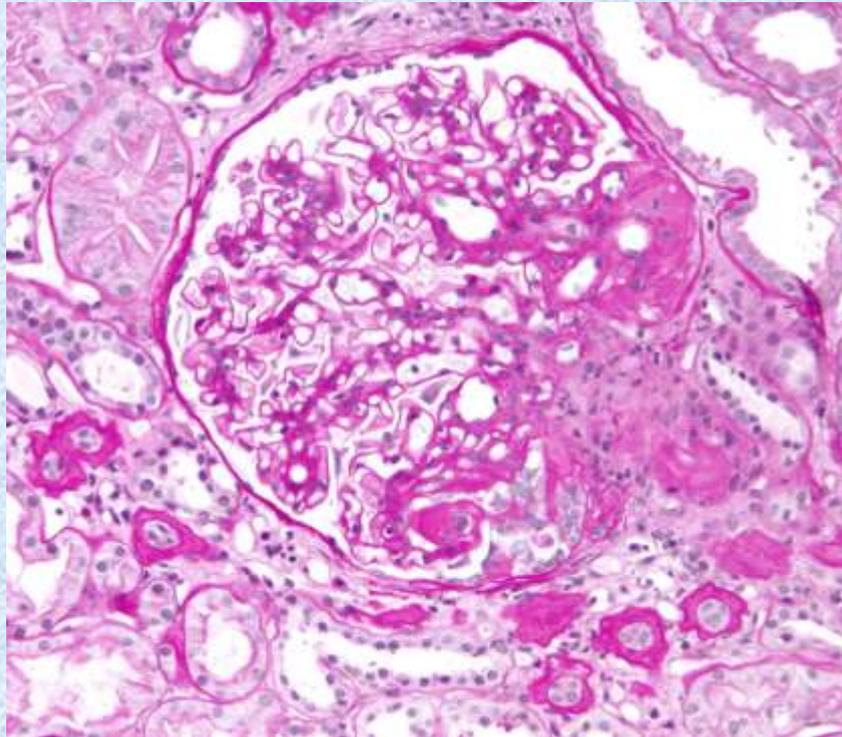
Pattern of glomerular involvement:

- **Diffuse**: All glomeruli are involved by the disease process. It could be:
 - ***Global***: involve all glomerular tuft
 - ***Segmental***: involve segment of the tuft

- **Focal**: Some glomeruli are involved by the diseases and others are normal; it could be
 - ***Global***: involve all glomerular tufts
 - ***Segmental***: involve segment of the tuft

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Glomerulonephritis



Segmental



Global

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Glomerulonephritis

Pathogenesis of glomerular injury in GN:

Usually immune complex mediated

1. Deposition of circulating immune complexes in glomerular BM: occurs in SLE, post bacterial or post viral infections
2. In situ formation of immune complexes: antibody react with antigen fixed to the glomerular BM: occurs in post-bacterial GN
3. Anti-glomerular basement membrane antibody: formation of antibodies against structure of glomerular BM; occurs in Good pasture syndrome

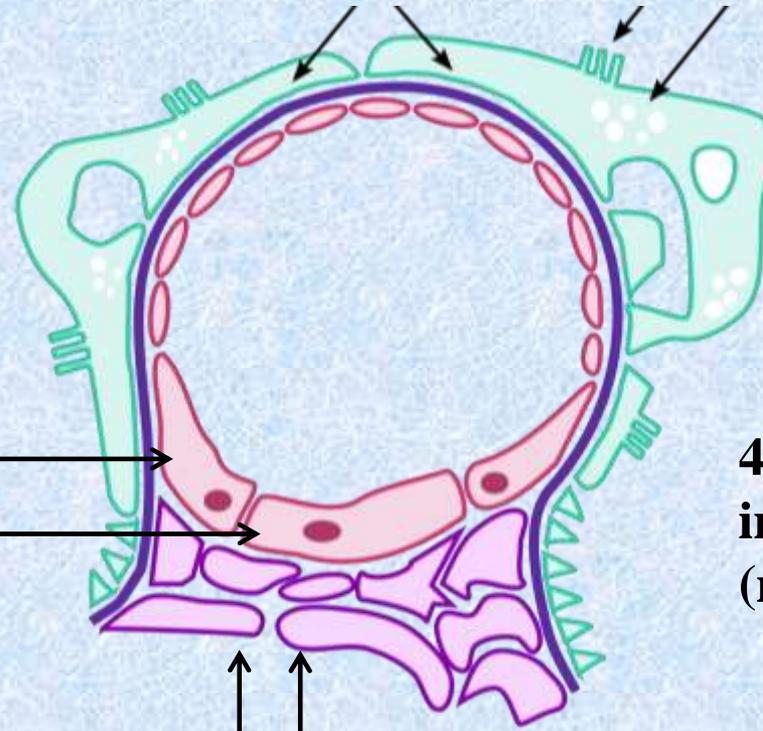
The immune complex induces injury of glomerular BM by activation of complement system with release of chemical mediators

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Glomerulonephritis

Tissue reaction of glomerular injury in cases of GN:

1- Proliferation of epithelial cells



2- Proliferation of endothelial cells

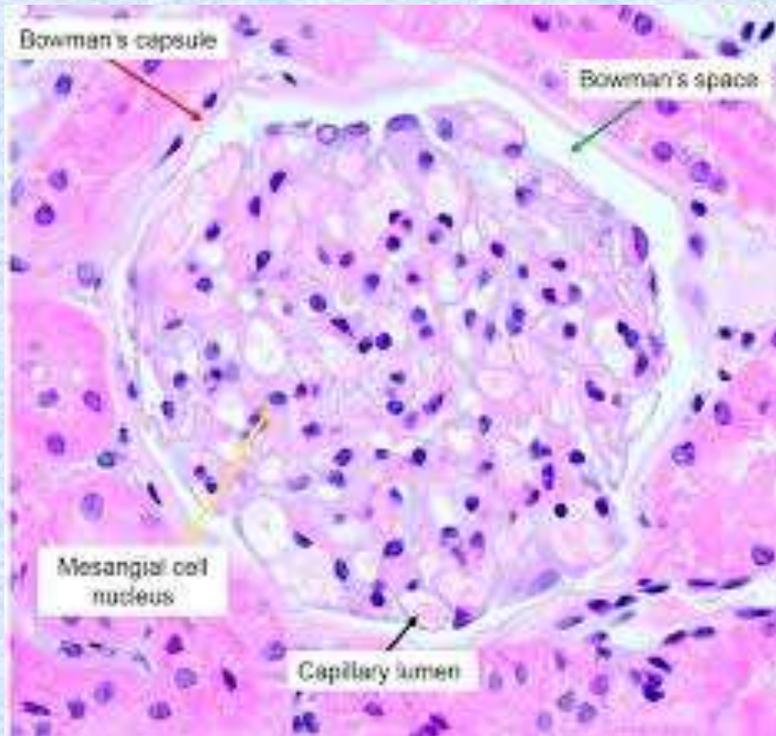
4- Infiltration by inflammatory cells (mainly neutrophils)

3- Proliferation of mesangial cells

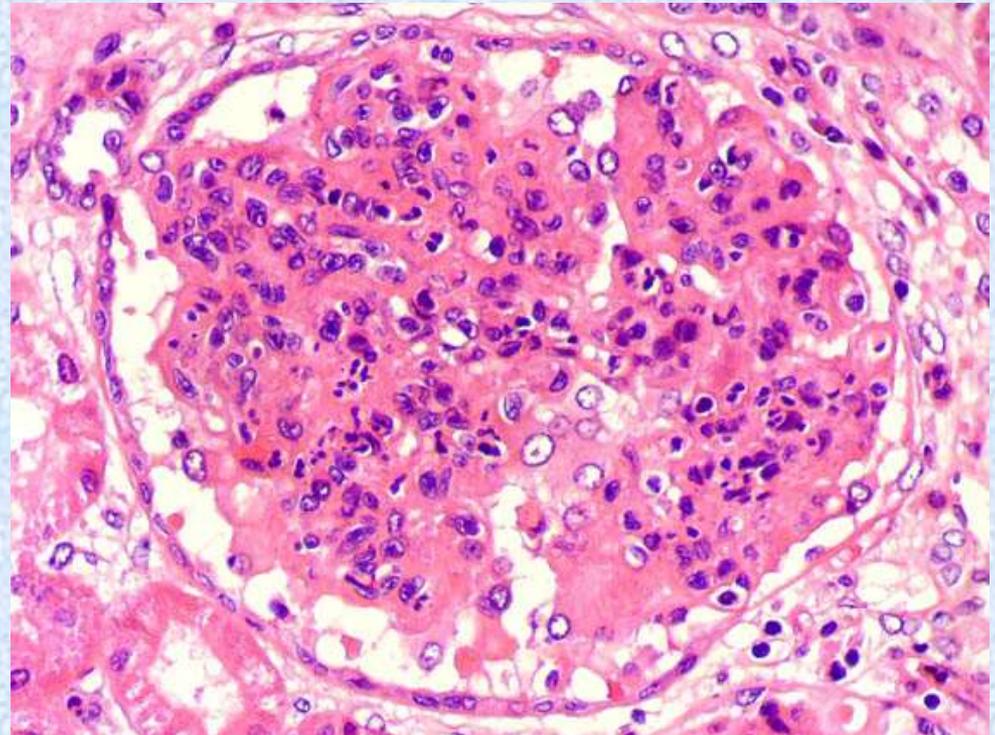
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Glomerulonephritis

Tissue reaction of glomerular injury in cases of GN:



Normal glomerulus



Hyper cellular glomerulus

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Glomerulonephritis

Main clinical patterns of GN:

Nephritic syndrome

- **Def:** A clinical complex usually with acute onset.
- **Characterized by:**
 1. Hematuria
 2. Oliguria
 3. Hypertension
 4. Nephritic edema

Nephrotic syndrome

- **Def:** A clinical complex usually with insidious onset.
- **Characterized by:**
 1. Heavy proteinuria
 2. Hypoproteinemia
 3. Hyperlipidemia
 4. Nephrotic edema

Pathology of urinary tract diseases

Glomerulonephritis

Main clinical patterns of GN:

Nephritic syndrome

- **Def:** A clinical complex usually with acute onset.
- **Characterized by:**
 - 4. Nephritic edema:
mild morning edema starts around the eyes and resolve along the day

Nephrotic syndrome

- **Def:** A clinical complex usually with insidious onset.
- **Characterized by:**
 - 4. Nephrotic edema:
Prominent generalized edema starts at the lower limbs and progress gradually

Pathology of urinary tract diseases

Glomerulonephritis

Nephritic syndrome

■ Common causes

➤ Primary renal diseases

1. Acute diffuse GN
2. Rapidly progressive GN
3. IgA nephropathy
(Berger`s disease)

➤ 2ry to systemic diseases

1. SLE
2. Purpura

Nephrotic syndrome

■ Common causes

➤ Primary renal diseases

1. Membranous GN
2. Membranoproliferative GN
3. Minimal change GN
4. Focal segmental GN

➤ 2ry to systemic diseases

1. Diabetic nephropathy
2. Renal amyloidosis
3. SLE

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Self assessment:

Adult polycystic kidney disease is characterized by:

- a. It is autosomal recessive disease
- b. Caused by mutation of *PKD* gene of chromosome 16 or 4
- c. Has no serious complications
- d. Usually a unilateral disease
- e. None of the above

Hyper cellularity of glomeruli in cases of GN is caused by:

- a. Epithelial cell proliferation
- b. Endothelial cell proliferation
- c. Mesangial cell proliferation
- d. Infiltration by neutrophils
- e. All of the above

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Thank you