Lec 3
Classification of Renal Diseases

الطبيبة الاختصاص

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اختصاص علم الامراض

- The kidney maintains filtration, electrolyte balance, and waste excretion.
- Diseases may affect glomeruli, tubules, interstitium, or blood vessels, leading to renal dysfunction.

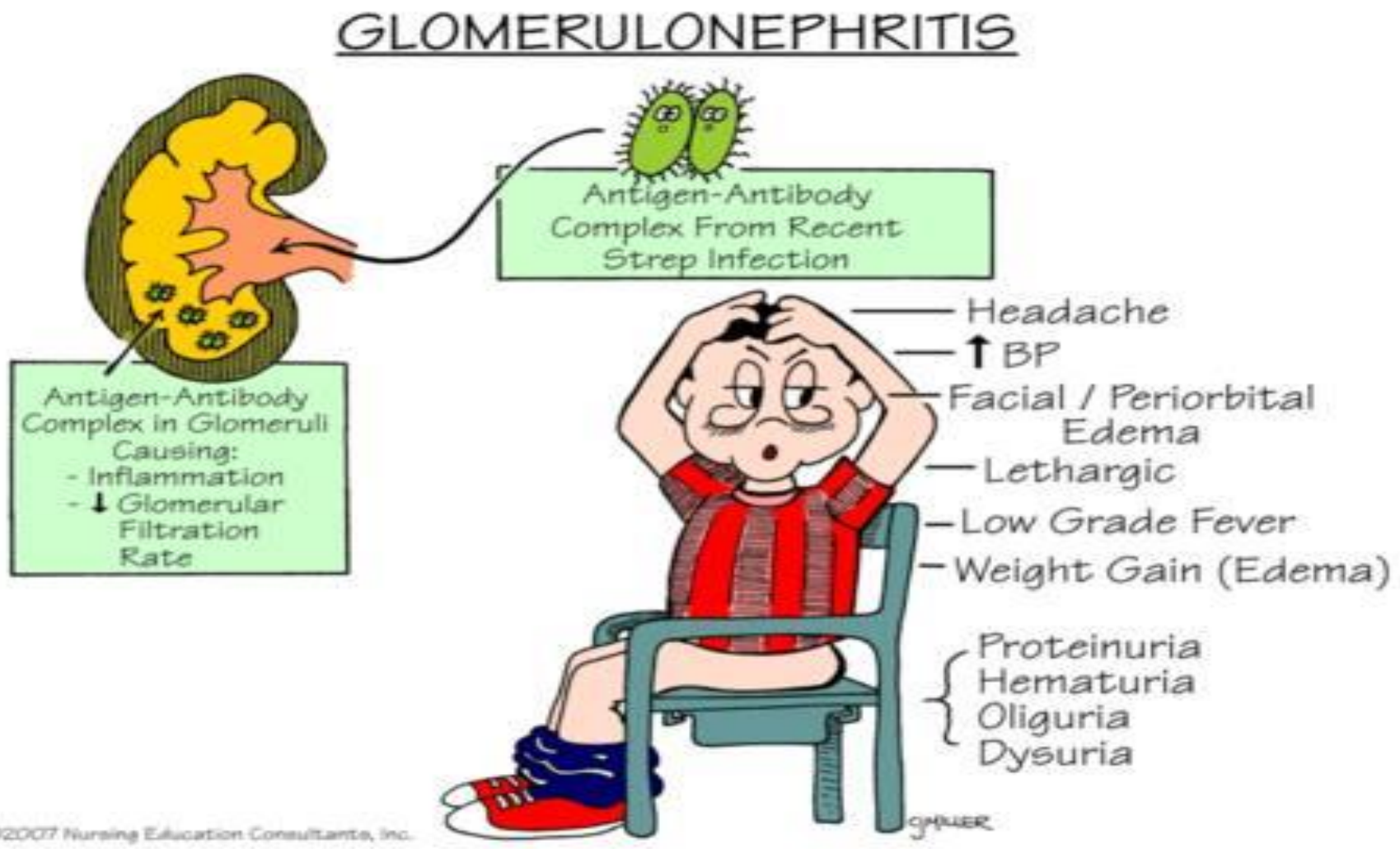
Major Classifications

1. Based on site of involvement
2. Based on etiology (cause)
3. Based on pathological process
4. Based on clinical presentation

Glomerular Diseases

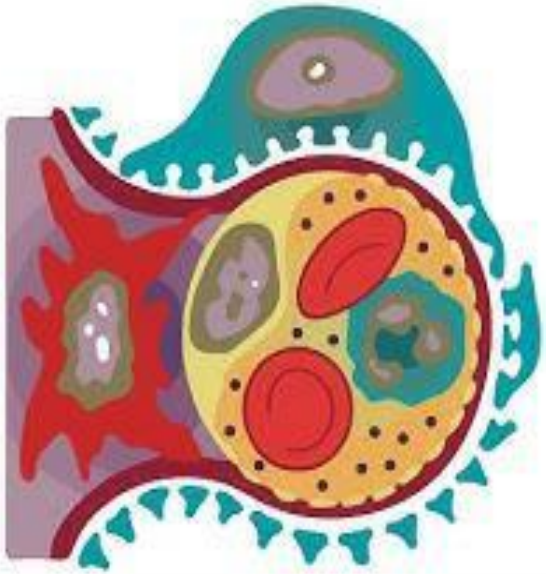
- Acute post-streptococcal GN – Immune complex deposition after infection → hematuria.
- Minimal change disease – Podocyte foot process effacement → heavy proteinuria.
- Membranous nephropathy – Subepithelial immune deposits → thick GBM.
- FSGS – Podocyte injury → segmental sclerosis.
- Diabetic glomerulosclerosis – Glycosylation of GBM → nodular sclerosis.

- Poststreptococcal GN

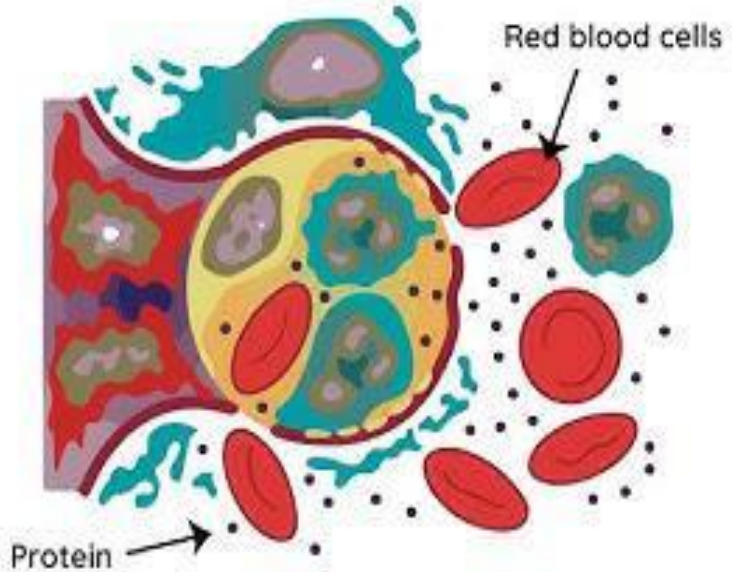


MINIMAL CHANGE DISEASE

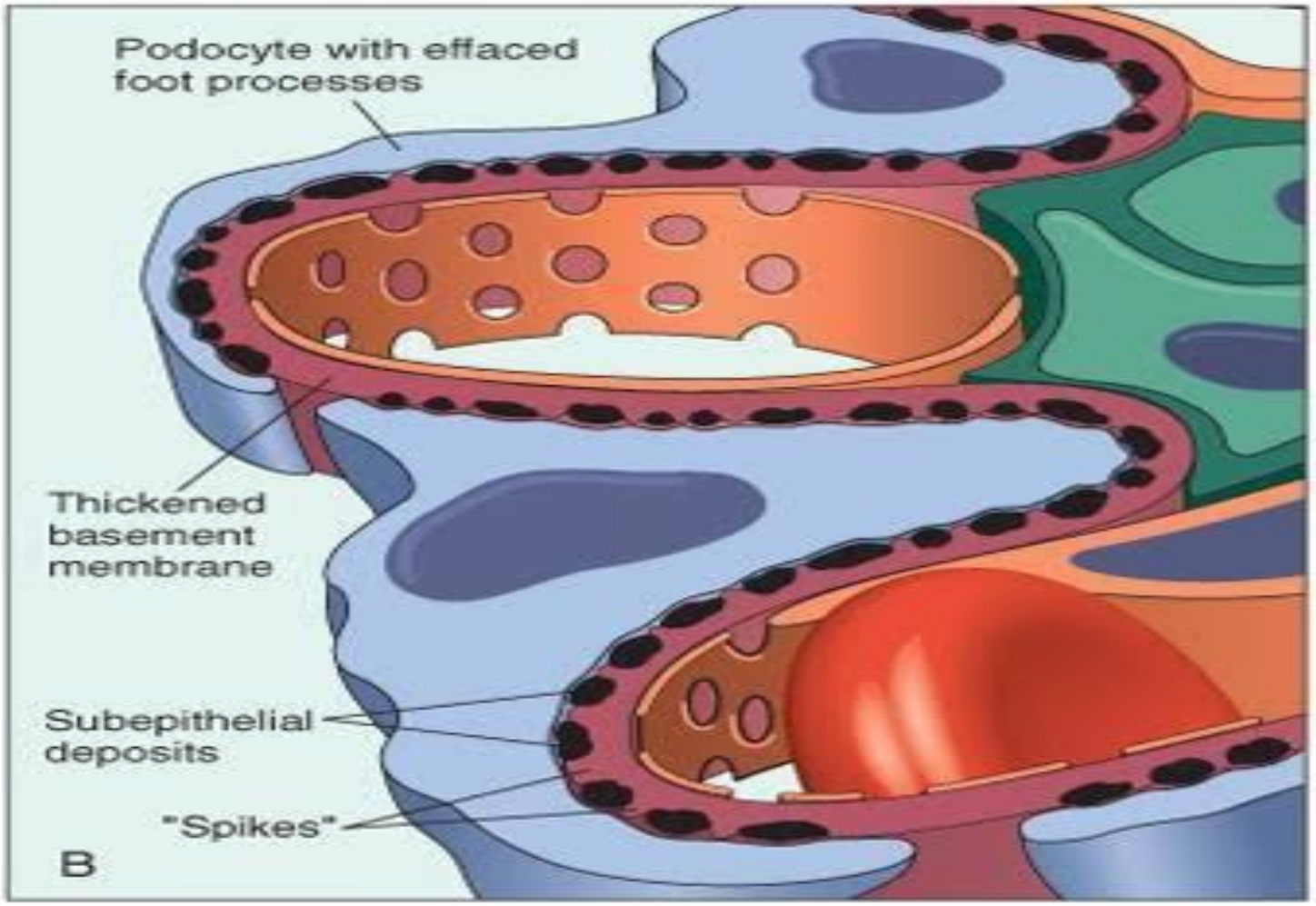
Normal Capillary



Minimal Change Glomerulopathy



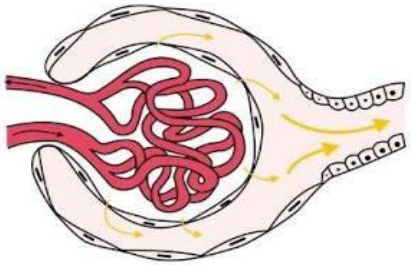
Memberanous nephropathy



FSGS

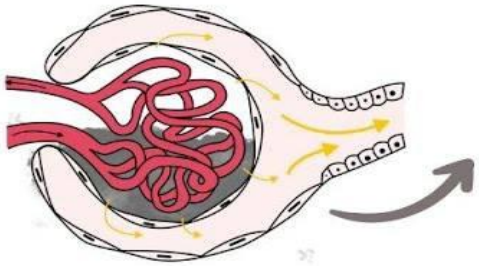
FOCAL SEGMENTAL GLOMERULOSCLEROSIS (FSGS)

Normal



Blood is filtered by the glomerulus

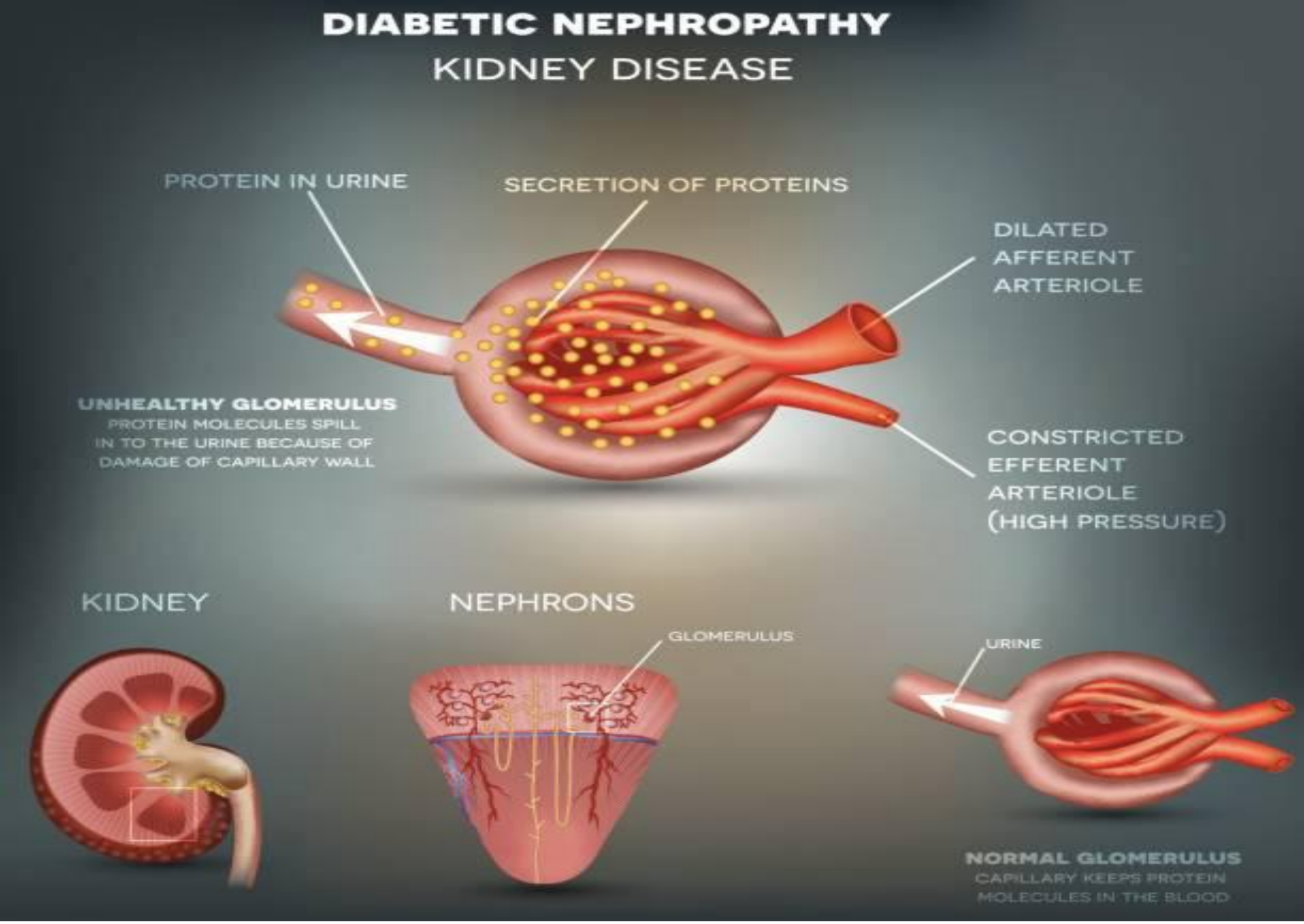
FSGS



Scarring in the glomerulus impairs kidney function

DIABETIC NEPHROPATHY

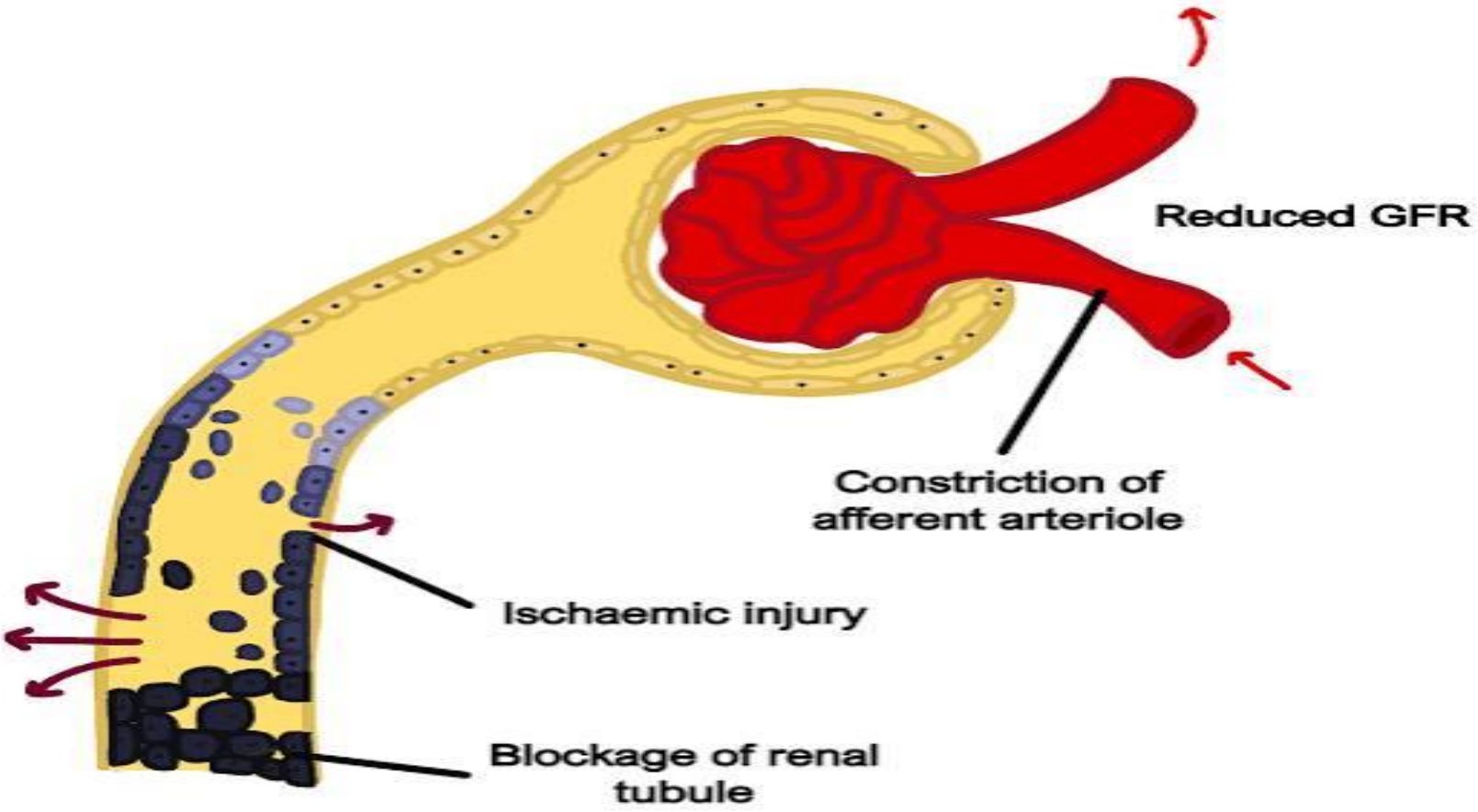
KIDNEY DISEASE



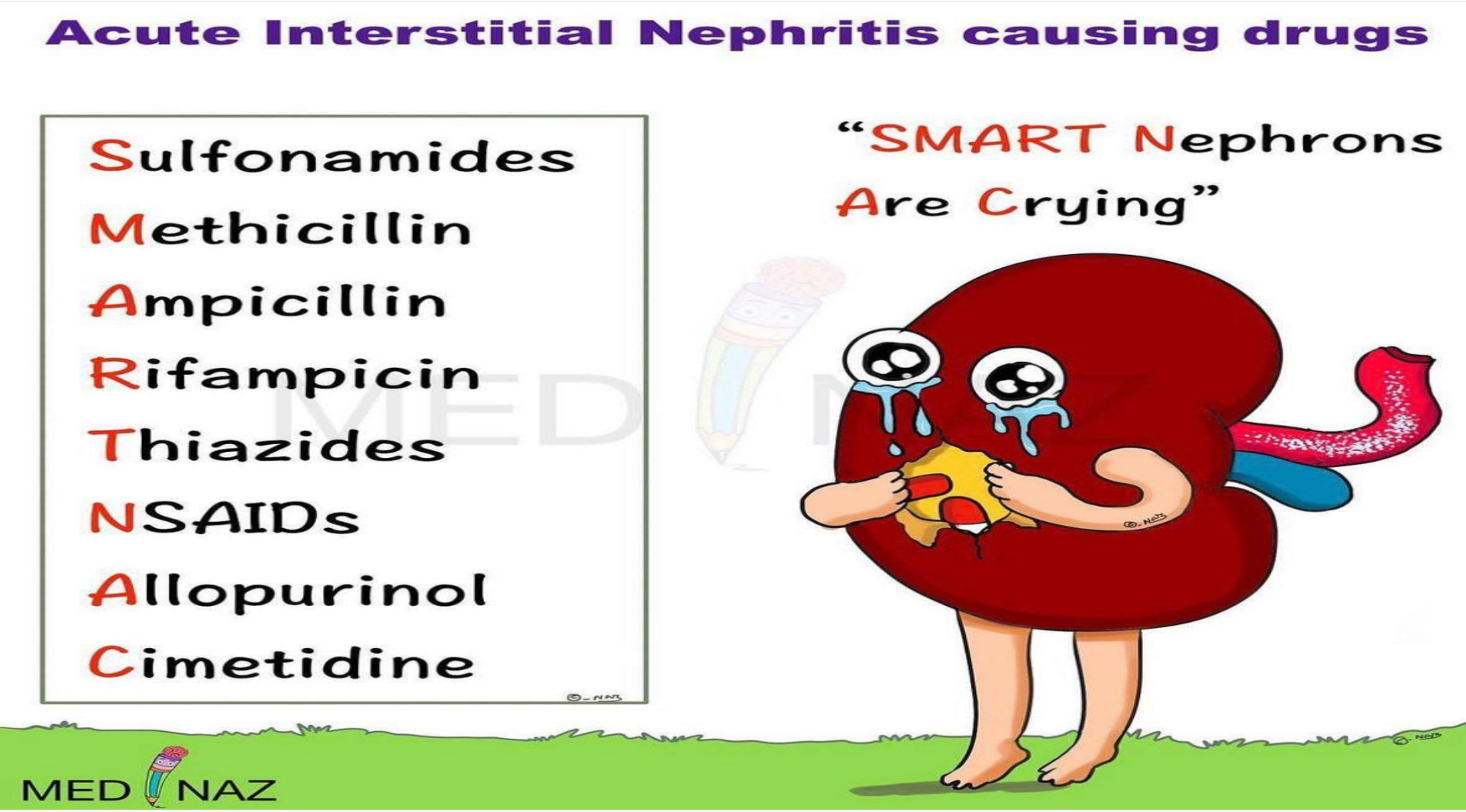
Tubular Diseases

- • Acute tubular necrosis – Ischemia or toxins → necrosis of tubular cells.
- • Tubulointerstitial nephritis – Drug hypersensitivity → eosinophilic inflammation.
- • Fanconi syndrome – Proximal tubular defect → aminoaciduria, glycosuria.

Acute tubular necrosis



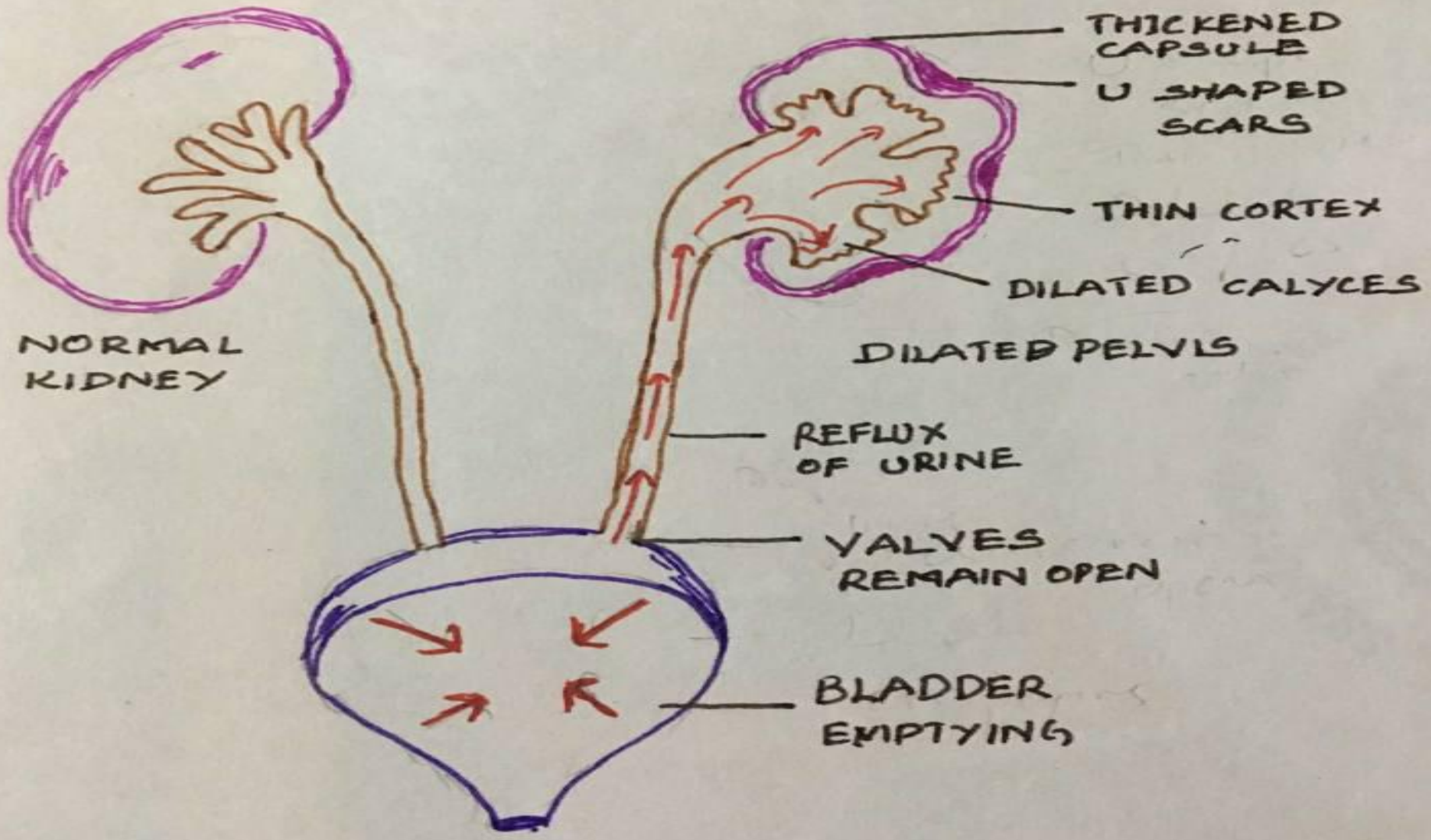
Tubulointerstitial nephritis



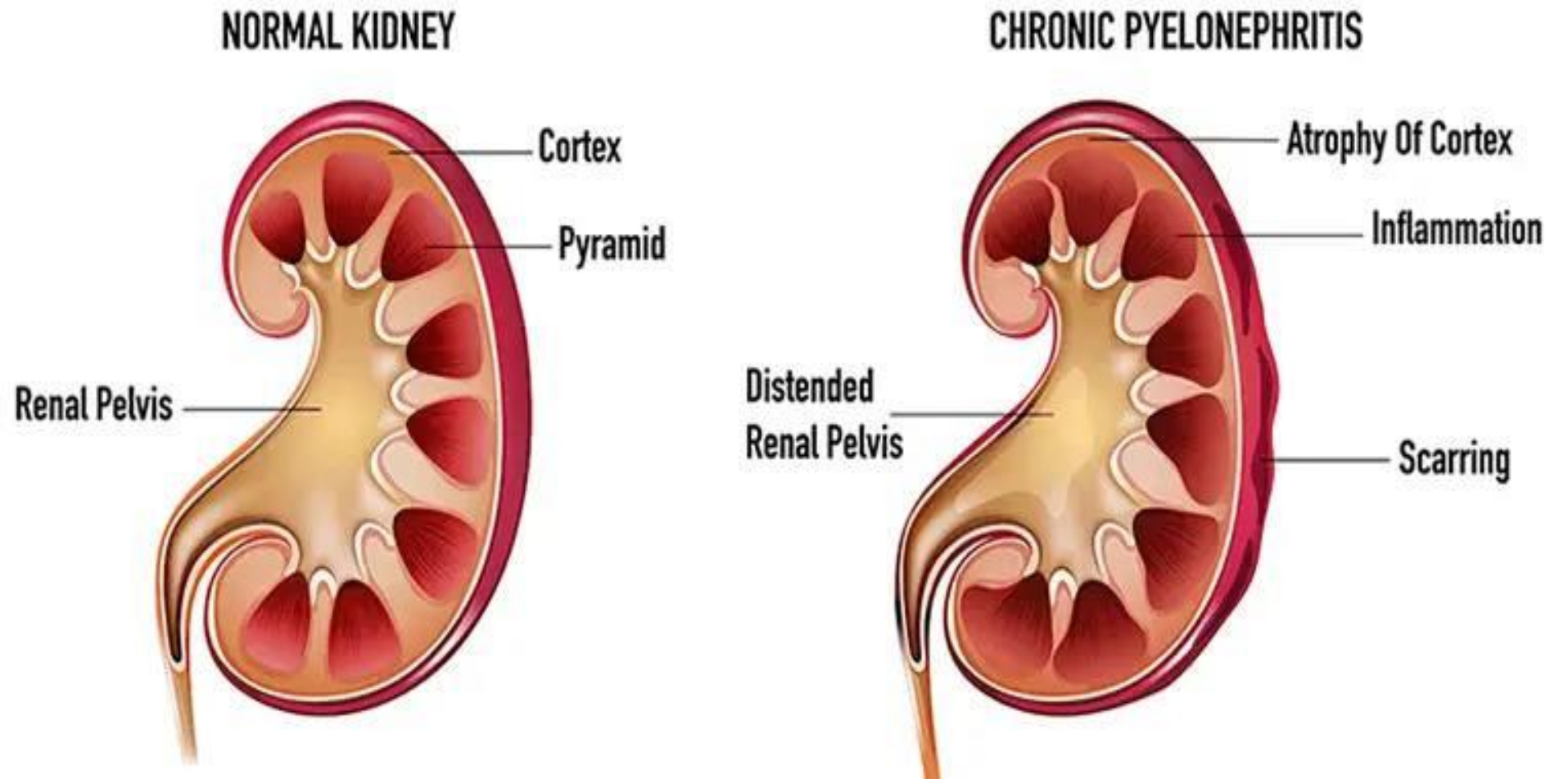
Interstitial Diseases

- • Acute interstitial nephritis – Allergic reaction → interstitial edema and eosinophils.
- • Chronic pyelonephritis – Recurrent infection → scarring and calyceal deformity.

CHRONIC PYELONEPHRITIS



KIDNEY PYELONEPHRITIS



Vascular Diseases

- • Hypertensive nephrosclerosis – Hyaline arteriolosclerosis → glomerular atrophy.
- • Renal artery stenosis – Ischemia of kidney → secondary hypertension.
- • Thrombotic microangiopathy – Endothelial injury → fibrin thrombi and renal failure.

Hypertensive nephrosclerosis

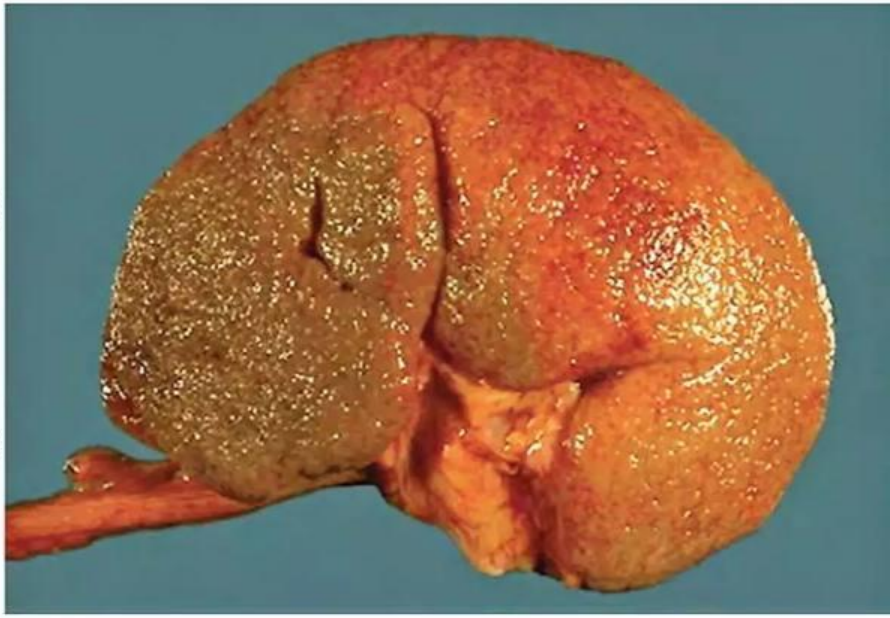
Patchy ischemic atrophy

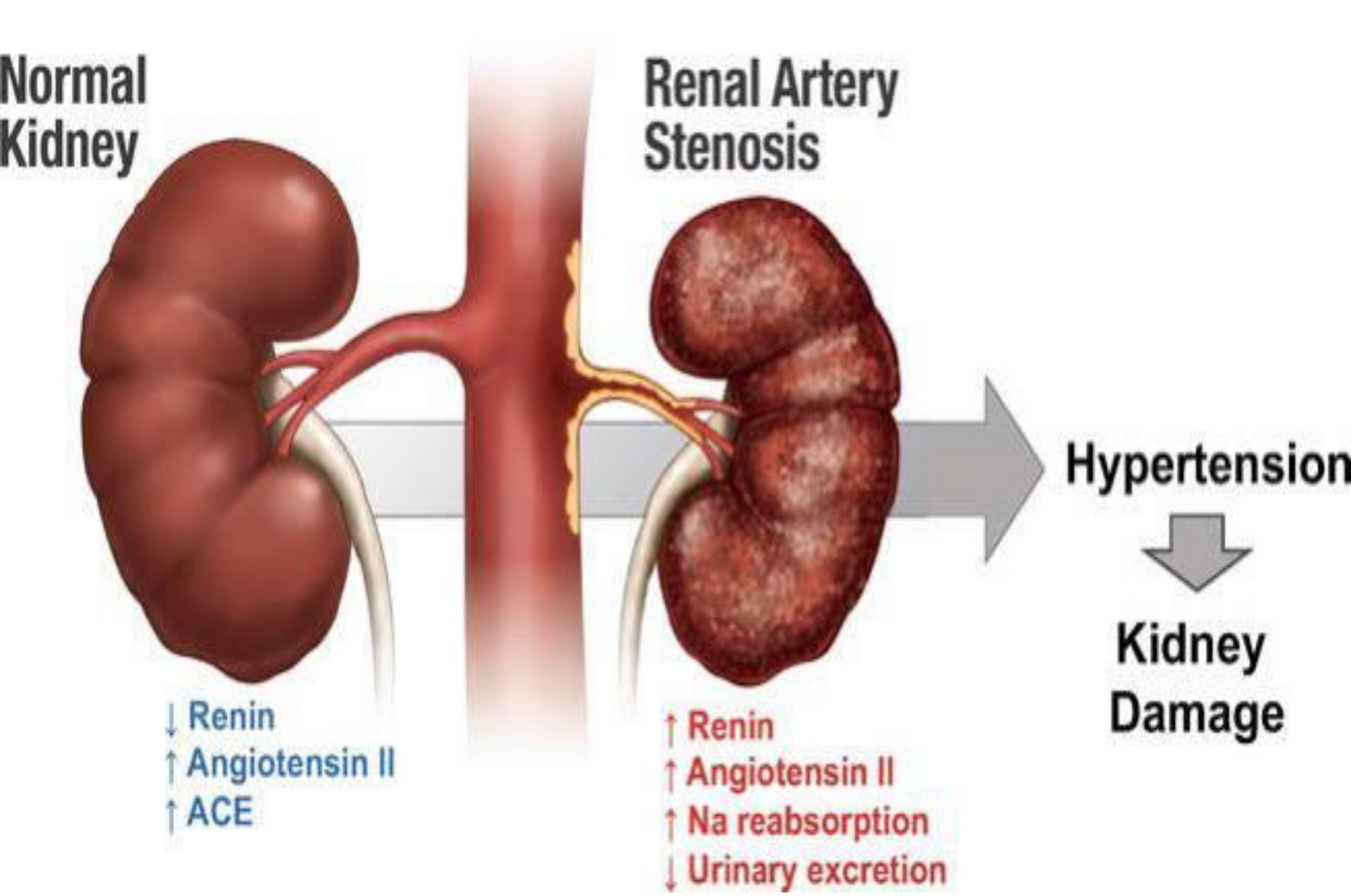
(As a consequence of vascular narrowing

Consists of :

a. Tubular atrophy and interstitial fibrosis

b. Glomerular alteration




Normal Kidney
Renal Artery Stenosis
↓ Renin
↑ Angiotensin II
↑ ACE
↑ Renin
↑ Angiotensin II
↑ Na reabsorption
↓ Urinary excretion
Hypertension
Kidney Damage

Thrombotic microangiopathy

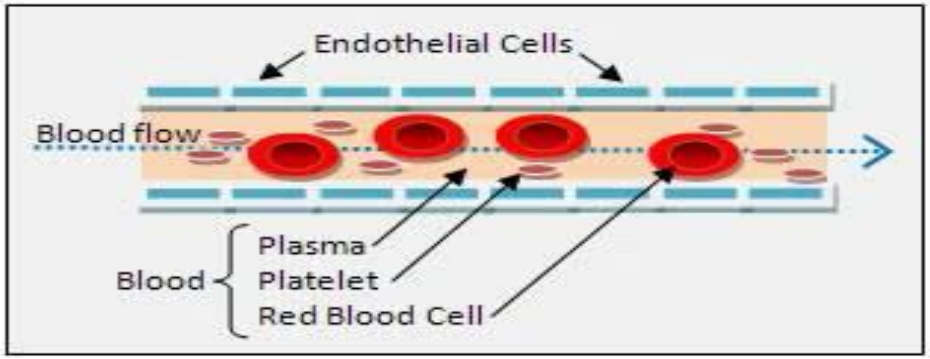


Figure 1: Diagram of a healthy capillary

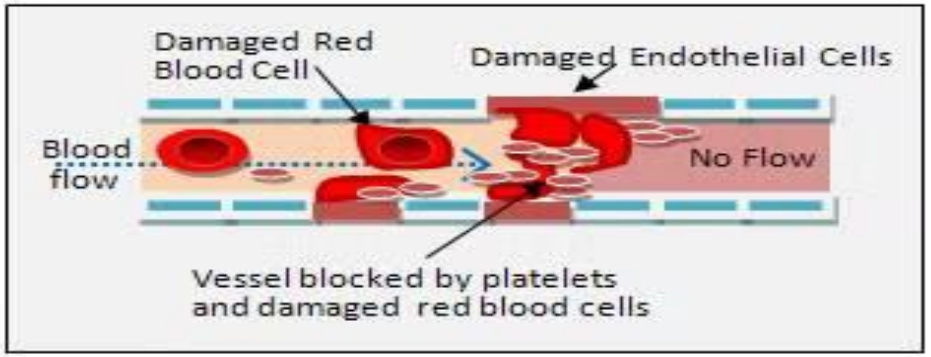


Figure 2: Diagram of a capillary damaged by TMA

Etiologic Classification

- • Infectious – Pyelonephritis: ascending bacterial infection.
- • Immunologic – Lupus nephritis: immune complex deposition.
- • Metabolic – Diabetic nephropathy: GBM thickening, mesangial expansion.
- • Toxic – Analgesic nephropathy: chronic NSAID use → papillary necrosis.
- • Genetic – Polycystic kidney disease: PKD mutation → cyst formation.

Pathologic Process

- • Inflammatory – Glomerulonephritis → immune inflammation.
- • Degenerative – Diabetic nephropathy → sclerosis.
- • Neoplastic – Renal cell carcinoma → malignant epithelial growth.
- • Cystic – Polycystic kidney disease → multiple cysts.
- • Obstructive – Hydronephrosis → urinary stasis and atrophy.

Clinical Presentation

- • Acute kidney injury – Sudden ↓GFR → oliguria, ↑creatinine.
- • Chronic kidney disease – Progressive nephron loss → uremia.
- • Nephrotic syndrome – Proteinuria, edema, hyperlipidemia.
- • Nephritic syndrome – Hematuria, hypertension, mild proteinuria.
- • Asymptomatic urinary findings – Microscopic hematuria/proteinuria.

Diagnostic Tools

- • Urinalysis: RBCs, protein, casts.
- • Serology: ANA, anti-GBM, ANCA.
- • Imaging: Ultrasound, CT, MRI.
- • Biopsy: Gold standard for diagnosis.

- • Classification aids diagnosis and management.
- • Combine clinical, lab, and pathology data.
- • Early detection prevents chronic kidney disease progression.


Thank you