

Kidney in systemic disease

a) Autoimmune and Collagen Vascular Diseases

i) Systemic Lupus Erythematosus (SLE)

- Immune complex glomerulonephritis (WHO classification reflects variety of patterns)
- Immune complex interstitial nephritis
- Lupus vasculopathy (various patterns)

ii) Scleroderma (Systemic Sclerosis)

- Microangiopathic lesions similar to “malignant” hypertension

iii) Rheumatoid Arthritis

- AA-amyloid nephropathy
- Drug-associated membranous immune complex glomerulopathy (gold, penicillamine)
- NSAID-induced minimal change nephrosis and interstitial nephritis
- Immune complex proliferative glomerulonephritis (uncommon)

iv) Sjögren’s Syndrome

- Chronic tubulointerstitial nephritis with tubular syndromes

v) Mixed connective tissue disease

- Immune complex glomerulopathy (usually membranous)

vi) Anti-phospholipid antibody syndrome

- Thrombotic microangiopathy

b) Chronic infection

i) Hepatitis B Virus

- Immune complex glomerulopathy (usually membranous)
- “Classic” PAN

ii) Hepatitis C Virus

- Immune complex glomerulopathy (usually MPGN)
- Cryoglobulinemic vasculitis (“mixed essential cryoglobulinemia”)

iii) Bacterial endocarditis

- Immune complex glomerulonephritis

iv) Malaria

- Immune complex glomerulopathy (various patterns)

v) Schistosomiasis

- Immune complex glomerulopathy (often MPGN)

vi) Syphilis

- Immune complex glomerulopathy (usually membranous)

vii) Acquired Immunodeficiency Syndrome (AIDS)

- Collapsing glomerulopathy (HIV-associated nephropathy)

c) Systemic vasculitis

i) “Classic” PAN

- Medium size necrotizing arteritis with sparing of the glomeruli

ii) Wegener’s granulomatosis

- Pulmonary-renal syndrome
- ANCA-associated “pauci-immune” necrotizing GN

iii) Microscopic polyangiitis

- Pulmonary-renal syndrome
- ANCA-associated “pauci-immune” necrotizing GN

iv) Churg-Strauss Syndrome

- Pulmonary-renal syndrome (actually, renal involvement is uncommon but can have either of the following two patterns of vasculitis along with eosinophilic interstitial nephritis):
 - a) ANCA-associated small vessel vasculitis (“pauci-immune” necrotizing GN)
 - b) Medium size vessel vasculitis sparing glomeruli (ANCA negative)

v) Henoch Schönlein Purpura (HSP)

- IgA-type immune complex glomerulopathy +/- intrarenal vasculitis

d) Goodpasture syndrome

- Pulmonary-renal syndrome with anti-GBM antibody-mediated GN

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e) **Diabetes Mellitus**

- Glomerulopathy with nephrosis and progressive renal failure
- Accelerated atherosclerosis and atheromatous renal disease
- Prominent arteriolosclerosis (afferent and efferent arteriolar hyalinosis)
- Papillary necrosis
- Pyelonephritis

f) **Amyloidosis**

- Glomerular deposition causing nephrotic syndrome and progressive renal insufficiency

g) **Cancer**

i) **Multiple Myeloma**

- Tubular toxicity (intracellular light chain accumulation) with Fanconi syndrome or ATN
- Cast nephropathy
- Amyloid
- Immunoglobulin (usually kappa) light chain nephropathy
- Type I (monoclonal) cryoglobulinemic glomerulopathy

ii) Hodgkin's disease and occasionally other lymphomas

- Minimal change nephrotic syndrome

iii) Carcinoma (lung, GI, breast, kidney, ovary)

- Membranous immune complex glomerulopathy

h) **Cirrhosis**

- i) IgA nephropathy (secondary)
- ii) Hepato-renal syndrome

i) **Sickle cell disease**

- Tubular dysfunction (especially impaired urinary concentrating ability)
- Papillary necrosis
- Microangiopathic chronic glomerulopathy

Pregnancy-related renal disease

a) Physiologic changes in pregnancy

- i) Increased renal plasma flow and GFR (30-50%)
- ii) Decreased blood pressure (10-15 mm Hg below pregravid level)

b) Toxemia of pregnancy (preeclampsia/eclampsia)

- i) Glomerular endothelial injury (swelling)

c) Bilateral cortical necrosis with DIC