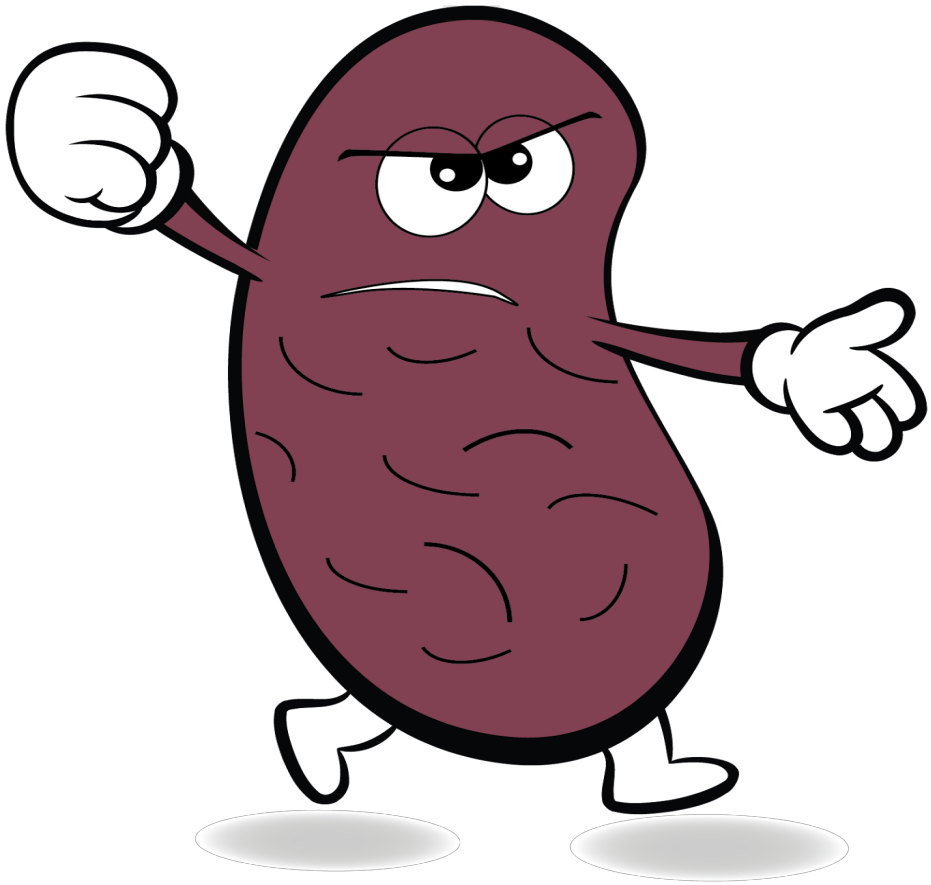
Glomerular diseases



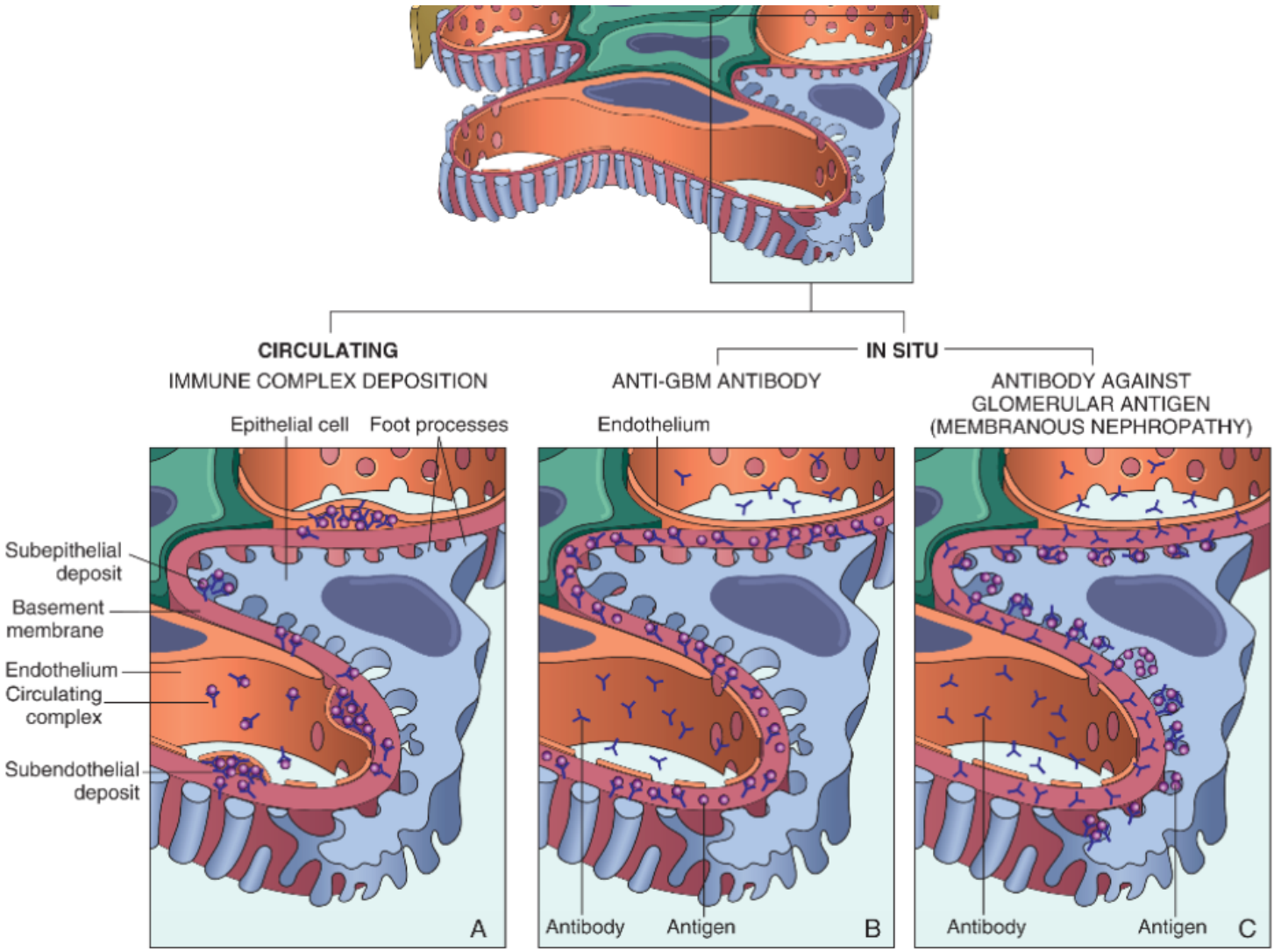
Objectives:

- Recognize the five major renal glomerular syndromes.
- Describe the main differential pathological diagnosis for each syndrome.
- Perform a clinicopathological correlation.
- Describe the patterns of injury of each syndrome.

Important note: During the previous blocks, we noticed some mistakes just before the exam and we didn't have the time to edit the files. To make sure that all students are aware of any changes, please check out this link before viewing the file to know if there are any additions or changes. The same link will be used for all of our work: Pathology Edit.

Introduction. Robbins page 519 (This page is additional for better understanding).

It is clear that *immune mechanisms* underlie most types of glomerular diseases.

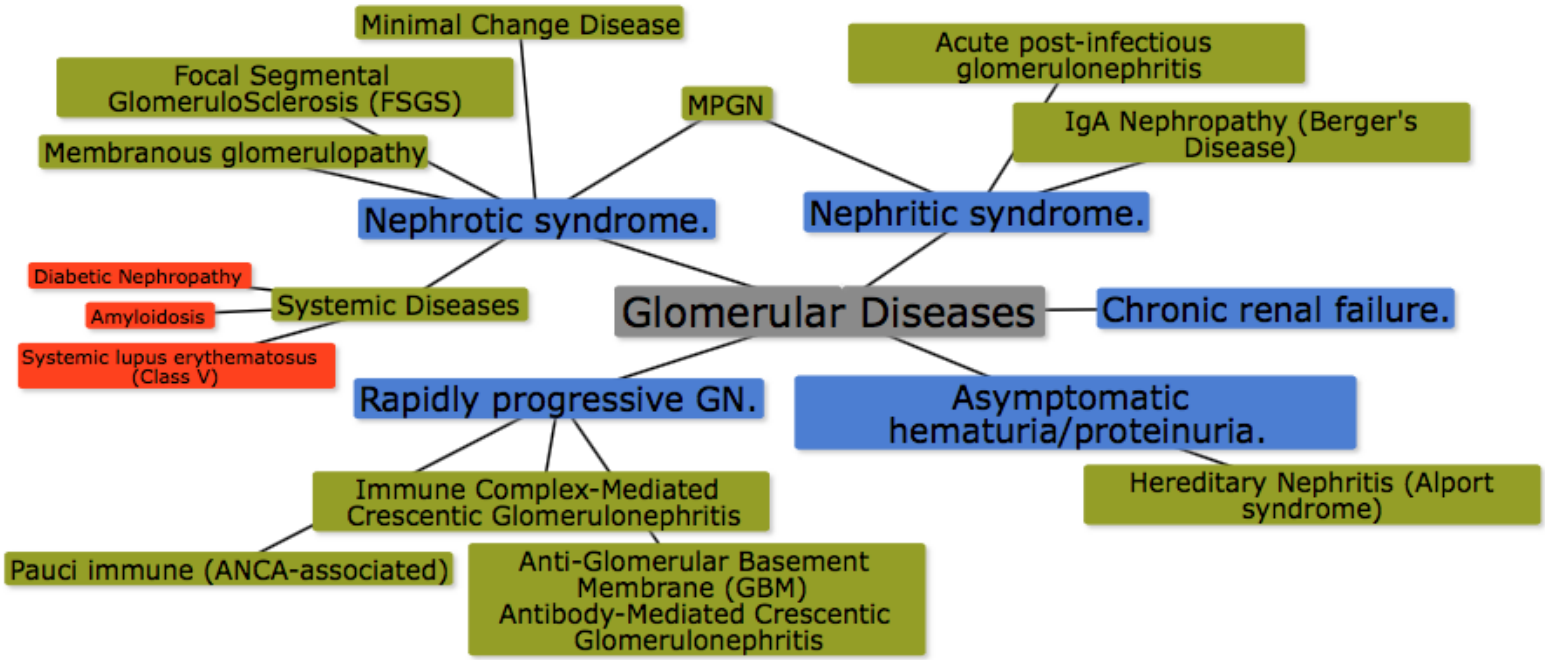


There are two forms of antibody-associated injury:

1. Injury resulting from *deposition of soluble circulating antigen-antibody complexes* in the glomerulus.
2. Injury by *antibodies reacting in situ within the glomerulus*, either:
    a. With insoluble fixed (intrinsic) glomerular antigens.
    b. Molecules planted within the glomerulus.

Glomerular Diseases are divided to 5 Clinical Syndromes:

1. Nephrotic syndrome.
2. Nephritic syndrome.
3. Asymptomatic hematuria/proteinuria.
4. Rapidly progressive GN.
5. Chronic renal failure.



What does syndrome mean?

A group of symptoms that consistently occur together or a condition characterized by a set of associated symptoms.

So they are different diseases with different etiologies - they appear different under the microscope - , but they have the same symptoms.

Dr. Najeeb lecture (Nephrotic & Nephritic syndromes) Very helpful lecture. (01:20:00)

Nephrotic Syndrome (Nephrosis). Robbins page 523

Pathogenesis:

- Increased Basement membrane permeability → proteins are filtered → heavy proteinuria → Hypoalbuminemia in Plasma (loss of **>3.5 g/day** of body Proteins).
- Hypoalbuminemia → drop of colloid pressure → fluid moves from blood to tissue → Edema.
  - Edema will be specially around the eyes (puffiness), & sometimes in hands & feet.
- Liver will try to compensate & produce proteins (including lipoproteins which are part of the structures of lipids) → hyperlipidemia.

Clinical manifestations:

1. Massive Proteinuria (loss more than 3.5g/day).
2. Hypoalbuminemia (less than 3g/dL).
3. Generalized pitting edema (Called **Anasarca**). **Why pitting edema?** Because it's composed only of plasma *without* proteins.
4. Hyperlipidemia.
5. Lipiduria.

There are 3 major (Primary) diseases that cause Nephrotic Syndrome:

1. Minimal Change Disease.
2. Focal Segmental GlomeruloSclerosis (FSGS).
3. Membranous glomerulopathy.

Table 13–2 Causes of Nephrotic Syndrome

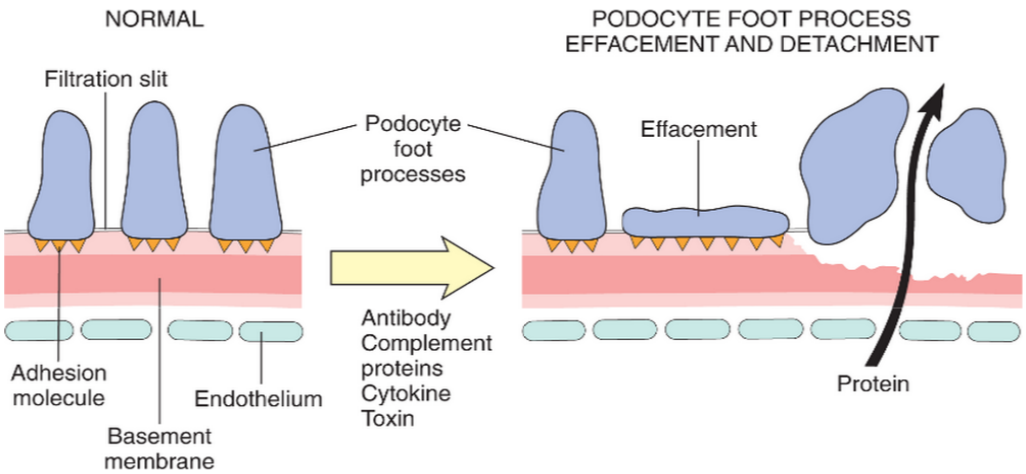
Cause	Prevalence (%)*	
	Children	Adults
Primary Glomerular Disease		
Membranous nephropathy	5	30
Minimal-change disease	65	10
Focal segmental glomerulosclerosis	10	35
Membranoproliferative glomerulonephritis	10	10
IgA nephropathy and others	10	15
Systemic Diseases with Renal Manifestations		
Diabetes mellitus		
Amyloidosis		
Systemic lupus erythematosus		
Ingestion of drugs (gold, penicillamine, "street heroin")		
Infections (malaria, syphilis, hepatitis B, HIV infection)		
Malignancy (carcinoma, melanoma)		
Miscellaneous (bee sting allergy, hereditary nephritis)		

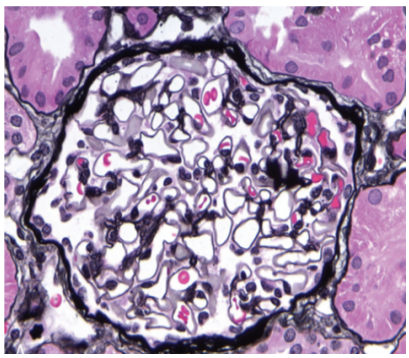
*Approximate prevalence of primary disease is 95% of the cases in children, 60% in adults. Approximate prevalence of systemic disease is 5% of the cases in children, 40% in adults.

Minimal Change Disease. Robbins page 524

Glomeruli have a *normal* appearance by **light microscopy** but show **diffuse effacement** [1] of podocyte foot processes when viewed with the **electron microscope**.

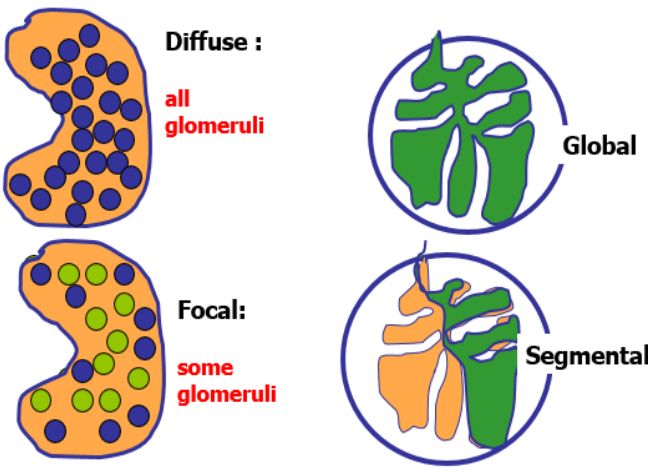
- The cause of effacement of podocyte is T Cells-Derived.
- Most common in children: most common between 1 to 7 years.
- Prognosis is good and most patient respond to course of corticosteroids.





Under the light microscope the silver methenamine–stained glomerulus appears normal, with a delicate basement membrane.

Focal Segmental GlomeruloSclerosis (FSGS). Robbins page 525



- **Diffuse:** All Glomeruli in Kidney Affected.
- **Focal:** Some Glomeruli in Kidney Affected.
- **Global:** Affect all parts of Glomeruli.
- **Segmental:** Part of Glomeruli Affected.

Focal segmental glomerulosclerosis (FSGS) is characterized histologically by sclerosis[2] affecting some but not all glomeruli (*focal involvement*) and involving only segments of each affected glomerulus (*segmental involvement*).

[1] effacement = محو
[2] Hardening of the tissue.

FSGS characterized by:

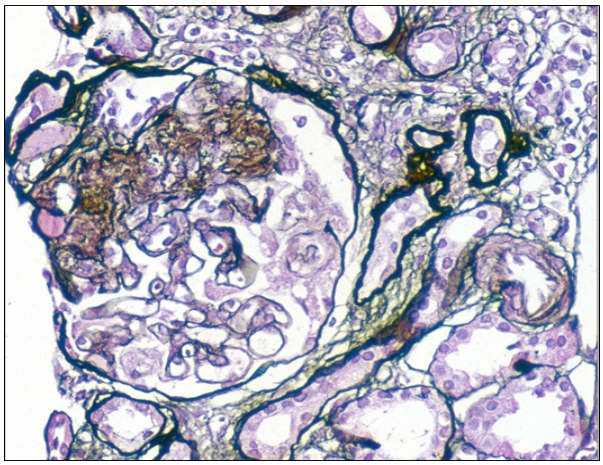
1- Obliteration[3] of capillary loops.
2- Increased matrix, without deposits and with diffuse foot process effacement by EM.
3- Adhesions can also be present.
4- Deposition of Hyaline masses **(Hyalinosis)**.
5-Focal Deposition of IgM are seen at Biopsy.

- FSGS Initially affects **Juxta-Medullary Glomeruli**.
- Usually affect old patient and adult but can affect children also.

May be primary or secondary :

1- Primary (idiopathic).

2- Secondary to other disease: HIV nephropathy (Very common), Heroin Injection, IgA nephropathy, Inherited or congenital "by mutation APO-L1 gene in chromosome 22 which create protein found in filtration barrier".

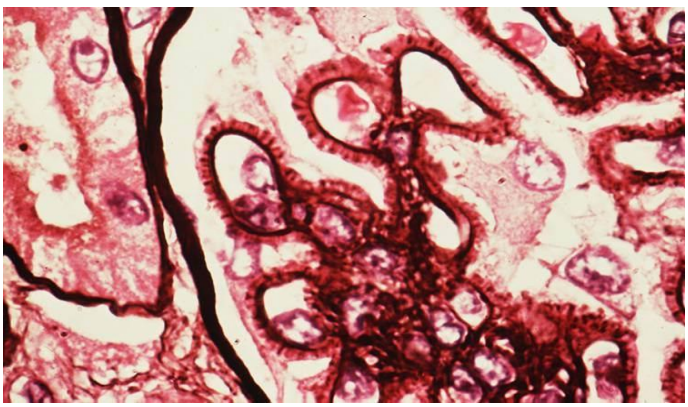


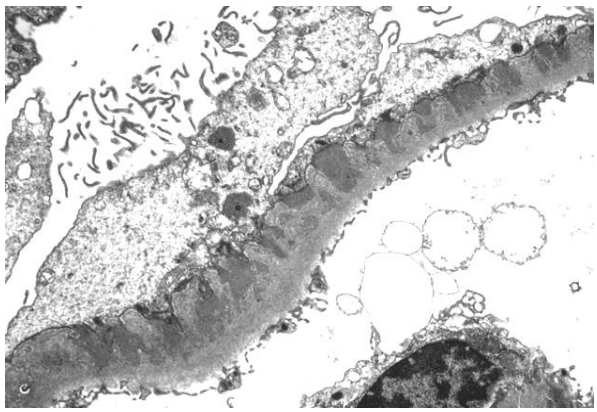
1- increased matrix (mesangial cells), 2-obliteration of capillary lumina, 3-Deposition of Hyaline masses (Hyalinosis)[4] and 4-adhesions.

Membranous nephropathy (membranous glomerulonephritis). Robbins page 526

It is a slowly progressive disease, characterized morphologically by the presence of *subepithelial immunoglobulin-containing deposits* along the GBM.

- Most common cause of Nephrotic Syndrome in Adults.





[3] total destruction
[4] Any of several degenerative processes that affect various cells and tissues, resulting in the formation of rounded masses or broad bands of homogeneous acidophilic substances that have a glassy appearance

LM: glomeruli may appear normal especially in early stage of the disease, but in severe cases we will see diffuse thickening of the capillary wall by the same method.
EM: we can see subepithelial deposits which is the cause of thickening of the capillary wall. The subepithelial deposits is separated by small **spike-like** protrusion of GBM matrix.

The **spikes** are formed by the reaction to the deposits, which can be visualized by **silver stain.**

Membranous nephropathy could be secondary to other disorders, including:

- infection (*chronic hepatitis B*, syphilis, malaria).
- malignant tumors.
- systemic lupus erythematosus.
- exposure to inorganic salts (gold, mercury).
- some drugs .

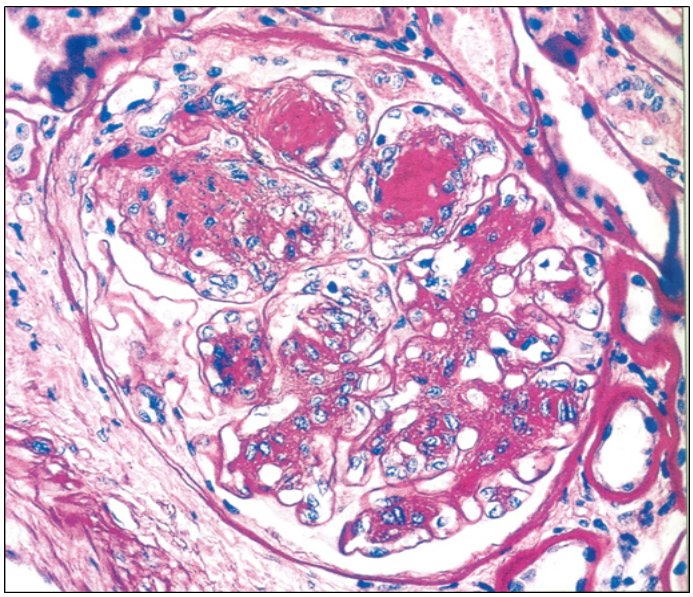
There are also 3 Systemic Diseases cause Nephrotic Syndrome:

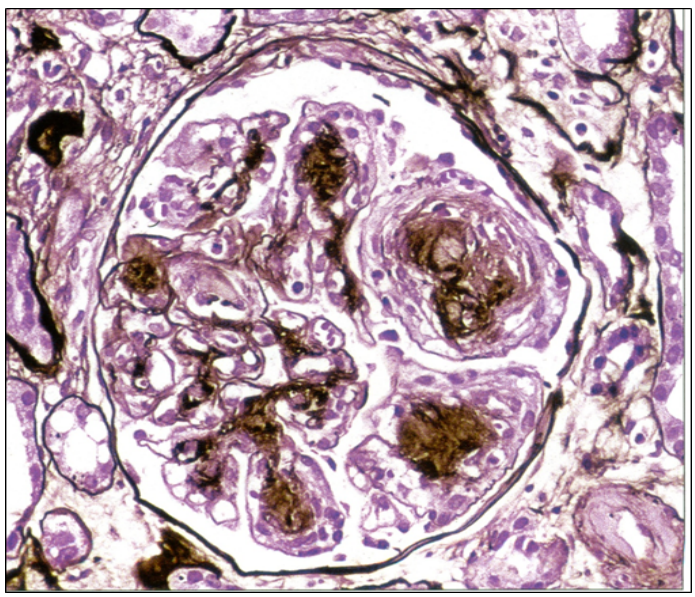
- **Diabetic Nephropathy.**
- **Amyloidosis.**
- **Systemic lupus erythematosus (Class V).**

Diabetic Nephropathy.

The lesions in diabetic nephropathy are characterized by *arteriolar hyalinization*, *mesangial matrix expansion* and *glomerular basement thickening*.

- Diabetic nephropathy usually associated with diabetic retinopathy (eyes abnormalities).



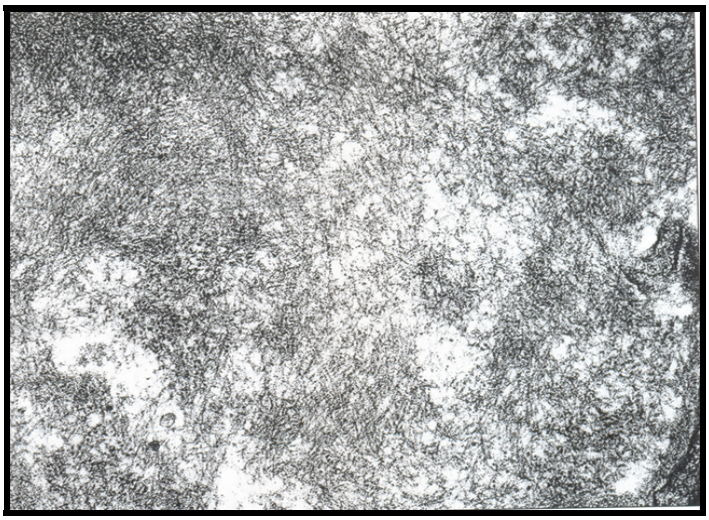


In Light Microscope:

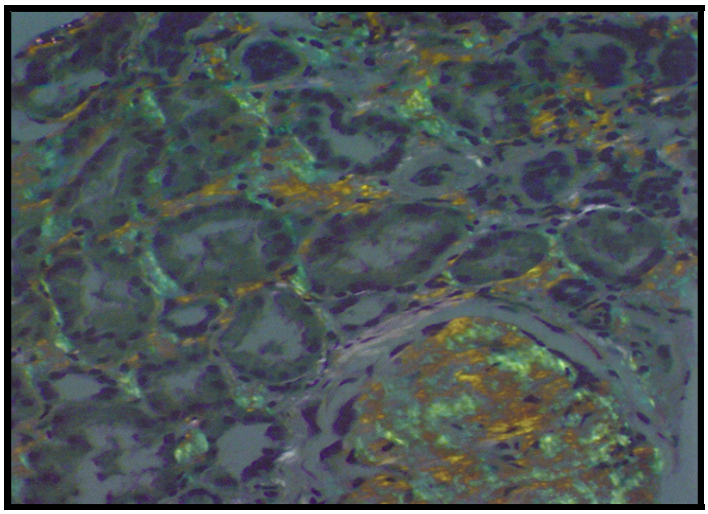
1. Mesangial Matrix expansion.
2. Lamellated appearance of the **Kimmelstiel-Wilson nodule** characteristic of the nodular sclerosis.
3. Arteriolar hyalinization. (detect the disease).
4. Tubulointerstitial fibrosis.

Amyloidosis.

Massive amyloid deposits are present in glomeruli and arterioles.



Randomly oriented, 8-10nm fibrils, typical of amyloid within the mesangium.

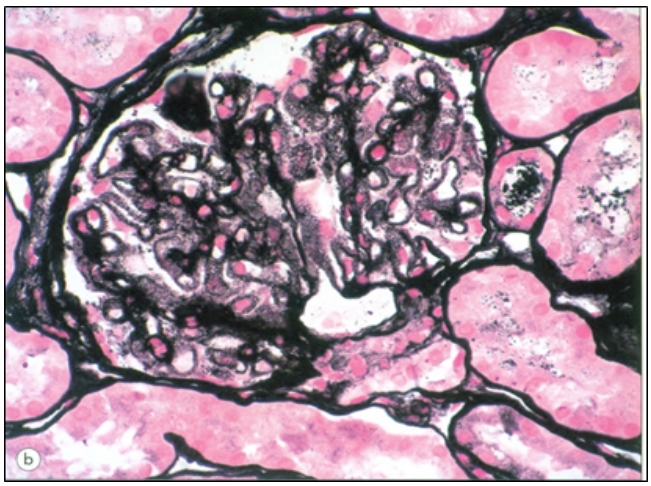


Tubular involvement with amyloid is verified by **apple-green birefringence** under polarized light.

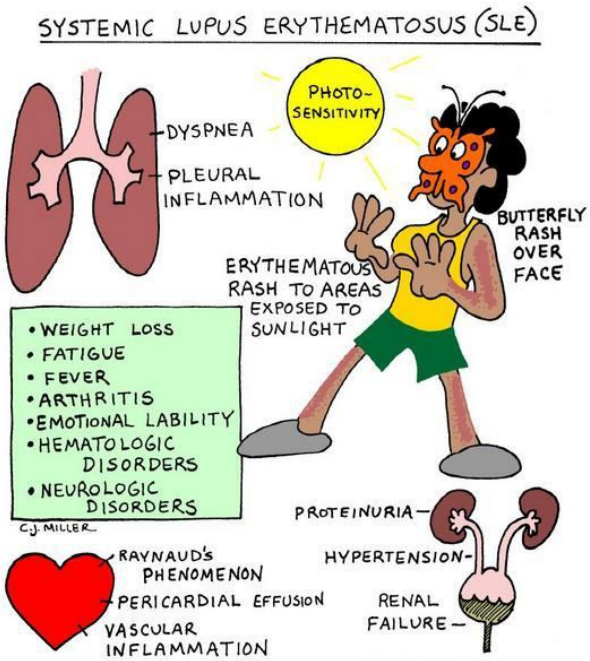
Systemic lupus erythematosus Class V (Lupus Nephritis).

SLE is an inflammation of the kidney, SLE can also damage the skin, joints, nervous system and virtually any organ or system in the body because antibodies act **against DNA**. It is an autoimmune and systemic disease.

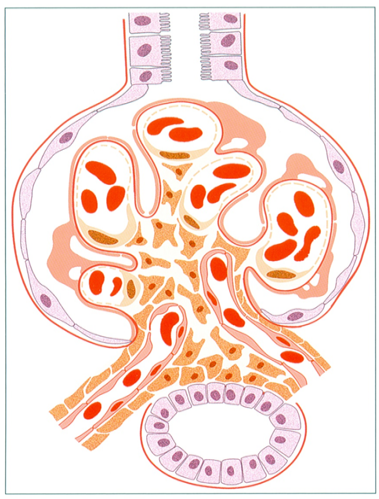
- These antibodies accumulate in subendothelial.



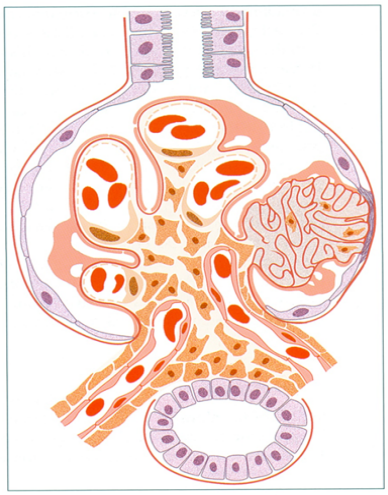
Spikes with destruction of the capillary wall increased mesangial matrix and thickening of peripheral capillary



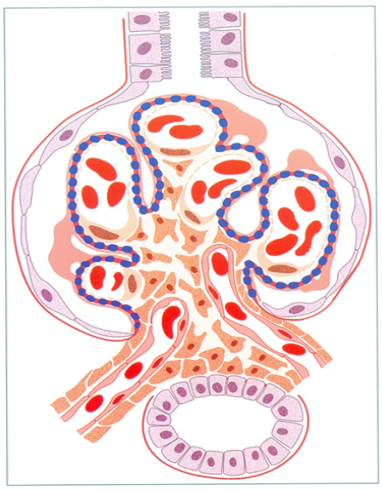
Minimal Change Disease



Focal Segmental GlomeruloSclerosis



Membranous glomerulopathy



SUMMARY

The Nephrotic Syndrome

- The nephrotic syndrome is characterized by proteinuria, which results in hypoalbuminemia and edema.
- Podocyte injury is an underlying mechanism of proteinuria, and may be the result of nonimmune causes (as in minimal-change disease and FSGS) or immune mechanisms (as in membranous nephropathy).
- *Minimal-change disease* is the most frequent cause of nephrotic syndrome in children; it is manifested by proteinuria and effacement of glomerular foot processes without antibody deposits; the pathogenesis is unknown; the disease responds well to steroid therapy.
- *FSGS* may be primary (podocyte injury by unknown mechanisms) or secondary (e.g., as a consequence of previous glomerulonephritis, hypertension, or infection such as with HIV); glomeruli show focal and segmental obliteration of capillary lumina, and loss of foot processes; the disease often is resistant to therapy and may progress to end-stage renal disease.
- *Membranous nephropathy* is caused by an autoimmune response, most often directed against the phospholipase A_2 receptor on podocytes; it is characterized by granular subepithelial deposits of antibodies with GBM thickening and loss of foot processes but little or no inflammation; the disease often is resistant to steroid therapy.
- MPGN and dense deposit disease are now recognized to be distinct entities. MPGN is caused by immune complex deposition; dense deposit disease is a consequence of complement dysregulation. Both may present with nephrotic and/or nephritic features.

Nephritic Syndrome. Robbins page 529

Pathogenesis:

- Inflammation → severe injury to the capillaries → filtration of blood cells → red blood cells casts in urine = grossly visible hematuria.
- GBM is blocked by inflammatory cells, RBC's & proteins → less filtration → oliguria → fluid retention → hypertension & azotemia.
- loss of proteins is less than in nephrotic syndrome because of the blockage of the GFM → less edema.
- Because of the decreased filtration → activation of RAAS system → even more hypertension!

Clinical manifestations:

1. **Hematuria.**
   - Dysmorphic RBCs + red cells cast.
   - Smoky brown color (Pepsi-Cola color).
2. Oliguria and Azotemia.
3. Hypertension: Due to fluid retention and renin release .
4. Mild edema and Proteinuria.

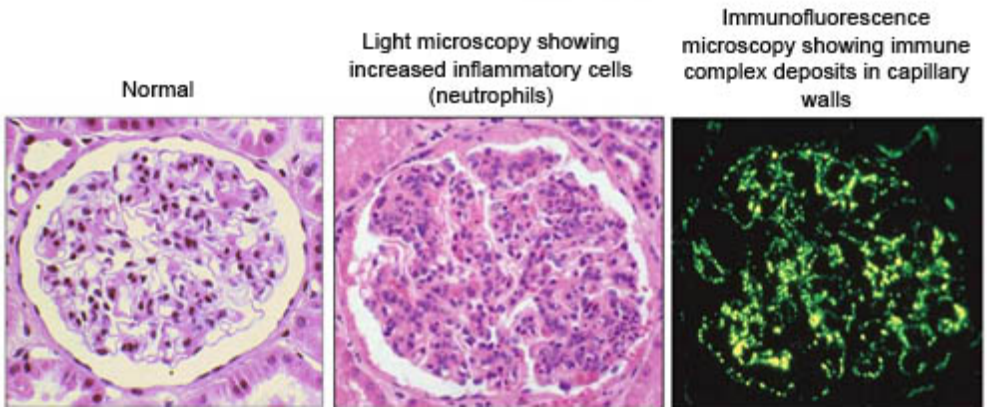
There are 2 Major (Primary) diseases that cause Nephritic Syndrome:

Acute postinfectious (poststreptococcal) glomerulonephritis.

One of the frequently occurring glomerular disorders, is caused by glomerular deposition of immune complexes resulting in proliferation of glomerular cells and infiltration of leukocytes, especially neutrophils.

The classic case of poststreptococcal GN develops in a child: 1 to 4 weeks after they recover from a group A streptococcal infection (e.g pharyngitis). Only certain "nephritogenic " strains of B-hemolytic streptococci evoke glomerular disease.

- In most cases the initial infection is localized to the pharynx or skin.



LM: Increased cellularity caused by proliferation and swelling of endothelial and mesangial cells and by infiltrating neutrophils and monocytes. (Sometimes there is necrosis of capillary wall).
Immunofluorescence studies: reveal scattered granular deposits of IgG and complement within the capillary walls and mesangial areas.

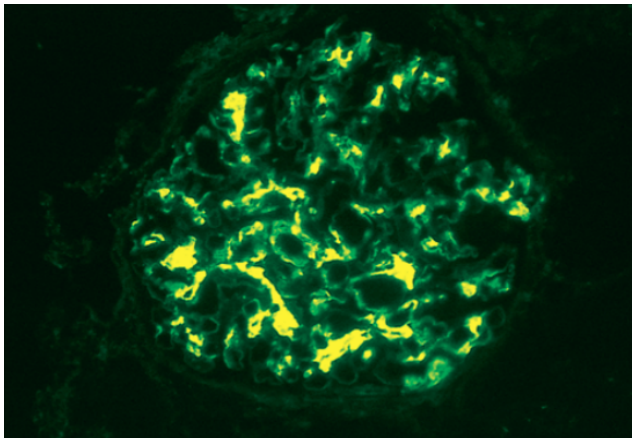
IgA Nephropathy.

This condition usually affects children and young adults and begins as episode of *gross hematuria* that occurs within 1 or 2 days of nonspecific *upper respiratory tract infection*.

- IgA nephropathy is one of the most common causes of recurrent microscopic or gross hematuria and is the most common granular disease revealed by renal biopsy worldwide.

Hallmark of the disease: deposition of **IgA** in the mesangium.

The lesions in IgA nephropathy vary a lot → glomeruli may be normal or may show mesangial widening and segmental inflammation.



The characteristic immunofluorescence picture is of mesangial deposition of IgA , often with **C3** and properdin and smaller amounts of **IgG** or **IgM**.

EM confirms the presence of electron dense deposits in the mesangium. The deposits may extend to the subendothelial area of adjacent capillary wall.

Chronic nephritic syndrome.

- Azotemia.
- Active urine sediment (variable).
- Proteinuria (variable).
- Past history of RPGN, nephrotic syndrome, nephritic syndrome.
- Hypertension.

Asymptomatic hematuria/proteinuria.

Hereditary Nephritis (Alport syndrome). Robbins page 531

Alport syndrome or **hereditary nephritis** is a genetic disorder characterized by glomerulonephritis, end-stage kidney disease, and hearing loss. Alport syndrome can also affect the eyes, causing eye abnormalities.

- GBM is composed of collagen IV, this collagen type is mutated in Alport Syndrome.

In the glomeruli there is alternating areas of extreme **thinning of the glomerular basement membrane (~120 nm) with thick, irregular areas with basket weaving** are shown.

The Nephritic Syndrome

- The nephritic syndrome is characterized by hematuria, oliguria with azotemia, proteinuria, and hypertension.
- The most common cause is immunologically mediated glomerular injury; lesions are characterized by proliferative changes and leukocyte infiltration.
- *Acute postinfectious glomerulonephritis* typically occurs after streptococcal infection in children and young adults but may occur following infection with many other organisms; it is caused by deposition of immune complexes, mainly in the subepithelial spaces, with abundant neutrophils and proliferation of glomerular cells. Most affected children recover; the prognosis is worse in adults.
- *IgA nephropathy,* characterized by mesangial deposits of IgA-containing immune complexes, is the most common cause of the nephritic syndrome worldwide; it is also a common cause of recurrent hematuria; it commonly affects children and young adults and has a variable course.
- *Hereditary nephritis* (*Alport syndrome*) is caused by mutations in genes encoding GBM collagen; it manifests as hematuria and slowly progressing proteinuria and declining renal function; glomeruli appear normal by light microscopy until late in the disease course.

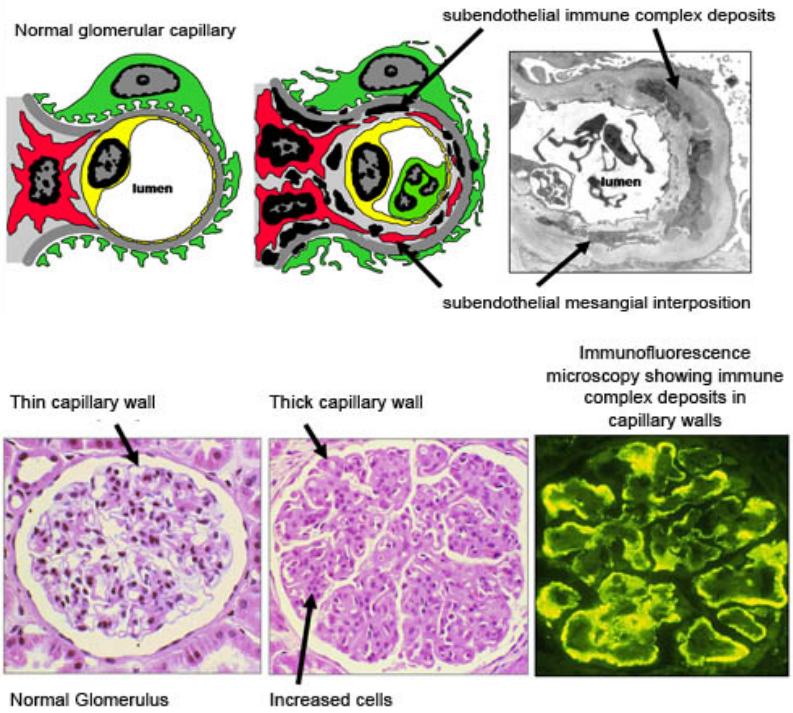
MembranoProliferative GlomeruloNephritis (MPGN). Robbins page 527

This Group can present as **Nephrotic and/or Nephritic Syndromes.**

Microscopic finding: hematuria (red cell casts), proteinuria <1 gram/24 hours, normal renal function.

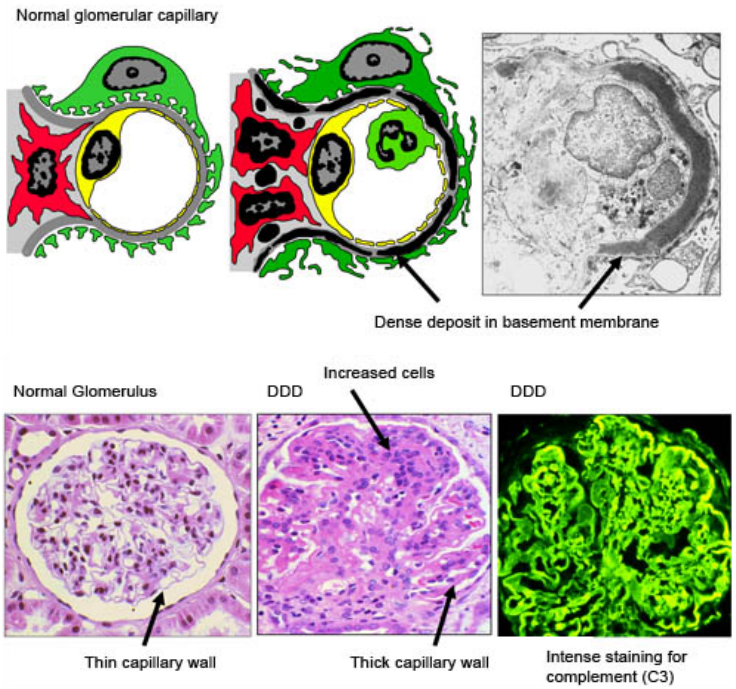
Membranoproliferative glomerulonephritis (MPGN)	
GLOMERULAR DISEASE	**CLINICOPATHOLOGIC FINING**
Type 1 MPGN	Most common type of MPGN : nephrotic presentation (60% of cases) some cases have nephritic presentation. **Association:** HBV ,HBC and SLE **MORPHOLOGY:** 1: glomerular are large with lobular appearance. 2: subendothelial immune complexes (granular deposition. 3: GBM is thickened. 4: proliferation of the mesangium causes " tram track" by splitting of the GBM. - Does not respond to corticosteroid & majority progress to Chronic renal failure.
Type 2 MPGN	Associate with C3 nephritic factor (C3NeF) < (autoantibody that bind to C3 convertase prevent the degradation of C3 Convertase ,causing sustained activation of the C3 alternative pathway, resulting in very low c3 level) Diffuse intramembranous deposits (dense deposit disease) - EM shows tram tracks. - Does not respond to corticosteroid - majority progress to Chronic renal failure
Type 3 MPGN	It is Rare and doesn't included in our objectives.

Type 1 MPGN



LM shows TramTrack Appearance[5], In EM: You will find Discrete immune complexes in the mesangium and subendothelial space.[6]

Type 2 MPGN



When viewed under the microscope, continuous, dense ribbon-like deposits are found along the basement membranes of the glomeruli, tubules, and Bowman's capsule.

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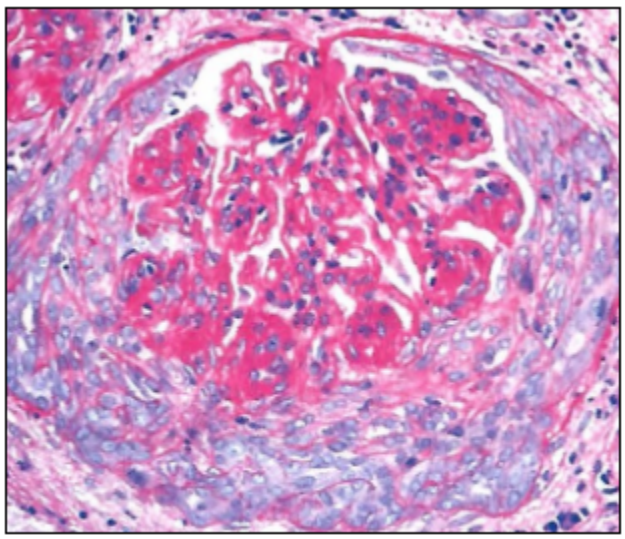
[5] مظهر سكة القطار

[6] Immune complexes are combinations of antigens and antibodies which bind to each other and then become lodged in the kidney. This activates the immune system, which causes inflammation and damage to the kidney itself.

Rapidly Progressive Glomerulonephritis. Robbins page 531

It is rapid deterioration of renal function which severe renal failure develops rapidly within weeks and months. It can be Idiopathic (primary) or glomerulonephritis. Laboratory finding typical of the nephritic syndrome.

- **Prognosis** is poor with rapid progression to renal failure.



1. hypercellular of glomeruli.
2. crescent formation of bowman space.

What is *glomerular crescent*?

Proliferation of parietal epithelial cells lining Bowman's capsule in the kidney; may protrude into Bowman's space and eventually lead to destruction of the glomerulus.

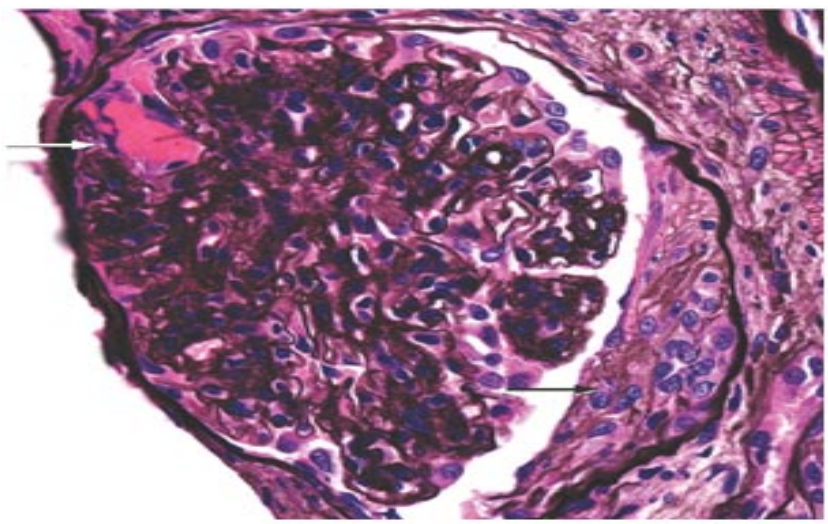
There are 3 Groups that cause RPGN. Mostly AutoImmune Diseases:

- Anti-Glomerular Basement Membrane (GBM) Antibody-Mediated Crescentic Glomerulonephritis.
- Immune Complex-Mediated Crescentic Glomerulonephritis.
- Pauci immune (ANCA-associated).

Anti-Glomerular Basement Membrane (GBM) Antibody-Mediated Crescentic Glomerulonephritis.

Characterized by linear deposition of **IgG** and **C3** on the GBM.

- Hemoptysis. associated with lung Disease (**GoodPasture Syndrome**) and you can see necrosis and crescent formation.



GoodPasture Syndrome: Antibodies bind also in the pulmonary alveolar capillary basement membranes leading to bleeding from the lungs.

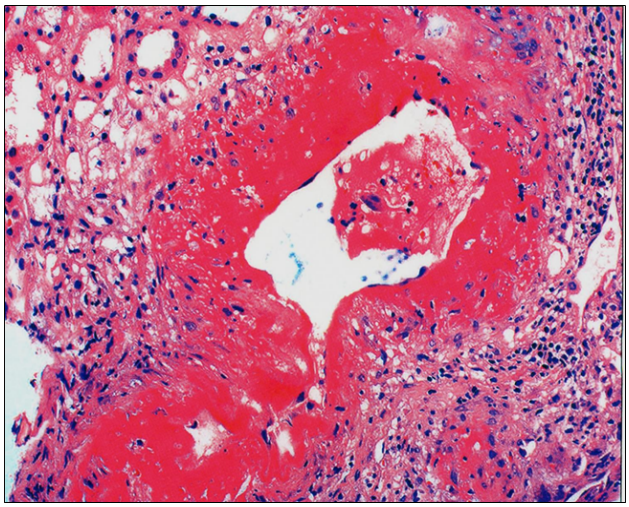
Immune Complex-Mediated Crescentic Glomerulonephritis.

Associated with: Post Streptococcal, SLE and IgA Nephropathy.
Characteristic by granular (**lumpy-bumpy**) pattern of staining of the GBM for immunoglobulin & complement.

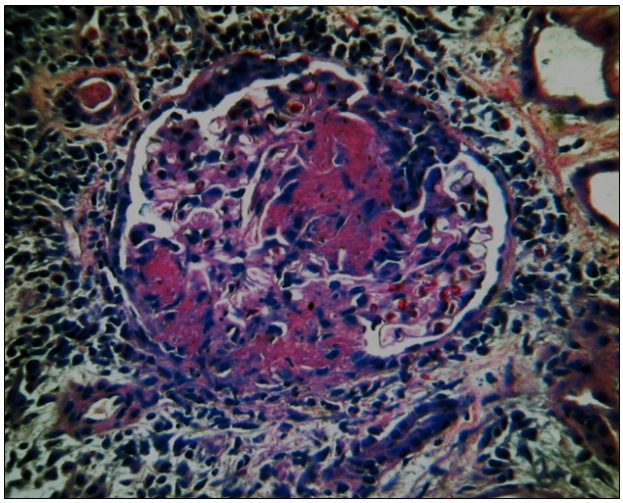
Pauci immune (ANCA-associated).Robbins page 532

The lack of anti-GBM antibodies and usually associated with **ANCA** such as **Vasculitis**.
(ANCA-associated): microscopic form of polyarteritis nodosa, Wegener's granulomatosis, Churg-Strauss syndrome, Drug-induced vasculitides.

Wegener's granulomatosis



Vessel with transmural necrosis involving the vessels circumferentially with a significant inflammatory infiltrate with mixed polymorphonuclear leukocytes and mononuclear cells.



Glomerulus demonstrating focal and segmental necrosis with adhesion to Bowman's capsule and proliferation of parietal epithelium.

RPGN: Clinical Features

	Clinical Signs	Serology	Biopsy
Immune-complex	Infection or lupus or IgAN history	↓ C3 (except IgAN) ANA+ if lupus	IgG & C3 deposits (or IgA deposits in IgAN)
Anti-GBM	Pulmonary hemorrhage 'Goodpastures'	Anti-GBM antibody	Linear IgG deposits
Pauci-immune	Skin rash, Pulm hemorr, upper respiratory granuloma 'Wegeners' (GPA)	ANCA antibody	No immune deposits

SUMMARY

Rapidly Progressive Glomerulonephritis

- RPGN is a clinical entity with features of the nephritic syndrome and rapid loss of renal function.
- RPGN is commonly associated with severe glomerular injury with necrosis and GBM breaks and subsequent proliferation of parietal epithelium (crescents).
- RPGN may be immune-mediated, as when autoantibodies to the GBM develop in anti-GBM antibody disease or when it arises consequent to immune complex deposition; it also can be pauci-immune, associated with antineutrophil cytoplasmic antibodies.

Chronic Renal Failure. Robbins page 541

Chronic kidney disease (End stage renal disease - ESRD) is the result of progressive scarring resulting from any type of kidney disease.

- kidney disease → function of the remaining intact nephrons are maladapted to such changes occurred by the disease → Chronic Renal Failure (ESRD) → uremia.

Uremic syndrome manifestation:

1. Skin manifestations → pruritus, uremic "frost"(صقيع) skin.
2. Cardiac manifestations → uremic pericarditis.
3. Neurological manifestations → peripheral neuropathy (lethargy)
4. Pulmonary complications → pneumonitis and hemorrhage.
5. Hematopoietic manifestations → anemia, bleeding diathesis.
6. Skeletal abnormalities → renal osteodystrophy (secondary hyperparathyroidism)
7. Other → metabolic imbalances (acid-base disorders)

Pathogenesis of uremic syndrome:
Uremic "Toxins" → Middle molecules[7] → The "Trade off" hypothesis[8].

Treatment of End Stage Renal Disease:

- Supportive therapy.
- Dialysis.
- Renal transplantation.

Chronic renal failure is characterised by: Symmetrically contracted kidneys, diffusely granular surfaces, tubular atrophy, arteriolar sclerosis, obliteration of the glomeruli and interstitial fibrosis.

Clinical course: the patient presents with proteinuria, hypertension, azotemia. Death to uremia is the role unless the patient has treated with dialysis or transplantation.

[7] any molecule with an atomic mass between 350 and 2000 daltons. These molecules accumulate in the body fluids of patients with uremia
[8] provides an explanation for some of the disorders of the uraemic syndrome.

Summary.

NephrOtic	Nephritic
POdocyte injury	Immune complex
1. heavy proteinuria = more proteins in urine. 2. Hypoalbuminemia (less than 3g/dL). 3. Generalized pitting edema. 4. Hyperlipidemia. 5. Lipiduria.	1. grossly visible hematuria = red blood cells in urine = red blood cell casts. 2. edema 3. hypertension 4. abnormal renal function

Syndrome	Disease	Under microscope	Characteristics	Note
Nephrotic Syndrome	**Minimal Change Disease**	LM: normal EM: extensive foot process effacement and microvillous transformation.	diffuse effacement [9] of foot processes	-
	FSGS	EM: diffuse foot process effacement	obliteration of capillary loops	- segmental sclerosis - adhesions - hyalinosis
	Membranous glomerulopathy	LM: no evident proliferation IF: evenly distributed granular capillary loop pattern of positively	global subepithelial deposits in LM	spike reaction in LM seen by GBM spike reaction
	Diabetes	LM: arteriolar hyalinization, mesangial matrix expansion, glomerular basement thickening	**kimmelstiel-wilson nodule** in EM	-
	Amyloidosis	LM: massive amyloid deposits in glomeruli and arterioles. tubular involvement	amyloid deposits in LM	verified by apple-green birefringence under polarized light
	Lupus	-	1. class V lesion or lupus membranous glomerulopathy, there is diffuse thickening of the peripheral capillary walls associated with an increase in mesangial matrix 2. reveal spike and dome pattern and moth-eaten appearance of the capillary wall	(b) is by silver methenamine (jones) stains

[9] effacement= محو

Nephritic Syndrome	**Acute post-infectious GN**	PMN in LM and hump IF	exudative proliferation with PMNs and endocapillary proliferation with scatted mesangial and large hump-shaped subepithelial deposits in	-e.g. .IgA Nephropathy with IF has mesangial deposits containing IgA
	IgA Nephropathy (Berger's Disease)	Definitive diagnosis is made by IF showing dominant or codominant staining with IgA in a predominantly mesangial pattern	There is mesangial cell and matrix increase, with mesangial deposits in LM	-
Nephrotic And/or Nephritic	**(MPGN)**	-	endocapillary proliferation and glomerular basement splitting due to mesangial and subendothelial deposits	**MPGN Type 1:** IgG and IgM Deposit. Complement 3, endocapillary proliferation,subendothelial deposits **MPGN Type 2:** Also Known as Dense Deposit Disease (DDD), Membranoproliferative pattern in LM, endocapillary proliferation ,and GBM splitting in EM **MPGN Type 3:** associated with Hepatitis B & C-
Asymptomatic hematuria/ proteinuria	**Alport syndrome**	-	Alternating areas of extreme thinning of the glomerular basement membrane (~120 nm)	
Rapidly Progressive GN	**Anti-Glomerular Basement Membrane (GBM) GoodPasture Syndrome**	laboratory finding typical of the nephritic syndrome.	Characterized by linear deposition of **IgG** and **C3** on the GBM, and you can see: - necrosis. - crescent formation.	RPGN is a rapid deterioration of renal function. it can be Idiopathic (primary) or GN.
	Immune Complex-Mediated Crescentic GN		**Associated with:** Post Streptococcal, SLE and IgA Nephropathy. **Characteristic by:** granular (lumpy-bumpy) pattern of staining of the GBM for immunoglobulin & complement	
	Pauci immune (ANCA-associated)		The lack of anti-GBM antibodies and usually associated with ANCA microscopic form of polyarteritis nodosa, Wegener's granulomatosis necrosis, inflammatory infiltrate with mixed polymorphonuclear leukocytes and mononuclear cells	

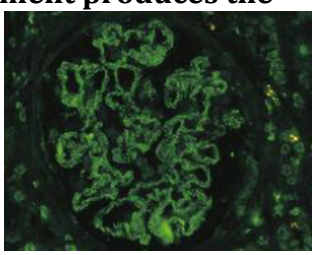
MCQ's.

The parents of a 6-year-old girl notice that she has become increasingly lethargic over the past 2 weeks. On examination by the physician, she has puffiness around the eyes. Urinalysis shows a pH of 6.5; specific gravity 1.011; 4+ proteinuria; and no blood or glucose. The 24-hour urine protein level is 3.8 g. The child's condition improves after glucocorticoid therapy. Which of the following findings by electron microscopy is most likely to characterize this disease process?

A. Subepithelial electron-dense humps
B. Areas of thickened and thinned basement membrane
C. Increased mesangial matrix
D. Effacement of podocyte foot processes

Ans:D, A child with nephrotic syndrome and no other clinical findings is most likely to have lipoid nephrosis, also called minimal change disease. The term *minimal change disease* reflects the paucity of pathologic findings. There is fusion of
foot processes, which can be seen only by electron microscopy

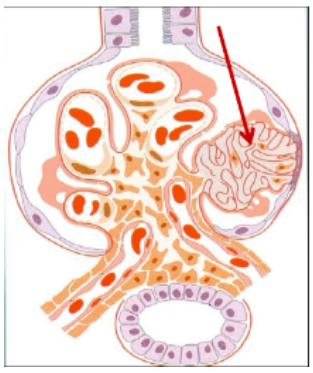
A 42-year-old man has experienced increasing malaise for the past month. He is bothered by increasing swelling in the hands and legs. On physical examination, there is generalized edema. He is afebrile, and his blood pressure is 140/90 mm Hg. Urinalysis shows a pH of 6.5; specific gravity 1.017; 4+ proteinuria; and no blood, glucose, or ketones. Microscopic examination of the urine shows no casts or RBCs and 2 WBCs per high-power field. The 24-hour urine protein level is 4.2 g. A renal biopsy specimen is obtained, and immunofluorescence staining with antibody to the C3 component of complement produces the pattern shown in the figure. Which of the following underlying disease processes is most likely to be present?



A. Chronic hepatitis B
B. AIDS
C. Multiple myeloma
D. Recurrent urinary tract infection

Ans:A, One of the most common causes of nephrotic syndrome in adults is membranous glomerulopathy, caused by immune complex deposition, shown here as granular deposits with C3. About 85% of cases are idiopathic, but some cases
follow infections (e.g., hepatitis, malaria)

A 12-year-old girl has experienced increasing malaise for the past 2 weeks. On physical examination, she has periorbital edema. The child is afebrile. Laboratory findings show proteinuria on dipstick urinalysis, but no hematuria or glucosuria. Microscopic examination of the urine shows numerous oval fat bodies. The serum creatinine level is 2.3 mg/dL. She receives a course of corticosteroid therapy, but does not improve. A renal biopsy is done; the biopsy specimen shows that approximately 50% of the glomeruli in the specimen are affected by the lesion shown in the figure. What is the most likely diagnosis?



A. Focal segmental glomerulosclerosis
B. Membranoproliferative glomerulonephritis type I
C. Postinfectious glomerulonephritis
D. Rapidly progressive glomerulonephritis

Ans:A,The biopsy specimen shows sclerosis of only a segment of the glomerulus (segmental lesion), and because only 50% of the glomeruli are affected, this is focal disease. Focal segmental glomerulosclerosis manifests clinically with nephrotic syndrome that does not respond to corticosteroid therapy.

In which disease the basement membrane become changes?
A.Minimal change disease
B.Focal segmental glomerulosclerosis
C.Membranous glomerulonephritis
D.Renal amyloidosis

Ans:C

In which disease the Immune complex deposition in subendothelial location?
A.Lupus nephropathy
B.Diabetic nephropathy
C.Focal segmental glomerulosclerosis
D.Renal amyloidosis

Ans:A, in MPGN type I

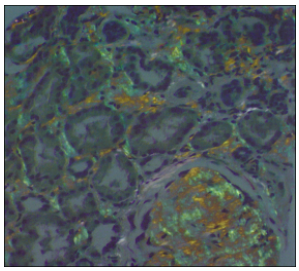
A patient presents with proteinuria, edema, and symptoms of renal insufficiency. There appears to be nodular hyaline masses in the glomerulus of the kidney. Tests indicate that the kidney has enlarged. The disease with the most similar presentation would be?
A. Diabetic Nephropathy
B. IgA Nephropathy
C. Osteomyelitis
D. Membranoproliferative glomerulonephritis

Ans: A

A patient presents with malar rash, photosensitivity, oral ulcers, arthritis, and signs of nephritic syndrome. Upon examination of his kidney, there appears to be crescent formation. Test samples reveal antibodies against DNA, ANA, and snRNA. What is the pathogenic mechanism of the disease?
A. Immune complex mediated
B. Infection
C. Tumor
D. None of the above

Ans: A

SAQs.



1.How can you detect the abnormalities in “minimal change” disease?
Using electron microscope.

2.The slide indicates Nephrotic syndrome due to?
Amyloidosis. Tubular involvement with amyloid is verified by apple-green birefringence under polarized light.

3- what’s the difference between Goodpasture Syndrome and Anti-Glomerular Basement Membrane (GBM)?
Goodpasture Syndrome includes both of the alveolar basement membrane and glomerular basement membrane, Anti-GBM include only the glomerular basement membrane.

4- Rapidly progressive glomerulonephritis is a group of disorders associated with severe oliguria and death from renal failure within weeks and is commonly associated with the formation of what?

- **crescent**
- **nodule**
- **membrane**
- **immune complex**

Contact us on: Pathology434@gmail.com
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Good Luck!

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