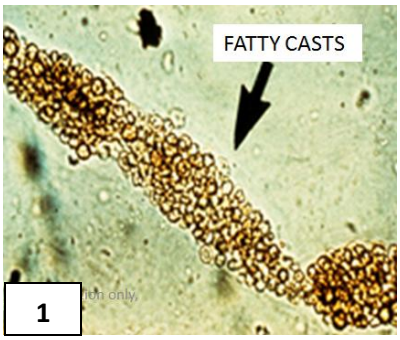
Unit V – Problem 8 – Pathology: Nephrotic Syndrome

- **What are the characteristics of nephrotic syndrome?**
  - Proteinuria (> 3.5 g/day, frothy urine).
  - Hypoproteinemia (< 3 g/dL).
  - Edema.
  - Fatty casts in the urine (image-1)
  - Hypelipidemia.

    Notice that nephritic syndrome is also associated with increased risk of infection and a hypercoagulable state (due to AT III loss in urine).



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- **What are the causes of nephrotic syndrome?**
  - **Primary causes:**
    - ✓ Focal segmental glomerulosclerosis.
    - ✓ Membranous nephropathy.
    - ✓ Minimal change disease.
    - ✓ Membranoproliferative glomerulonephritis.
  - **Secondary causes:**
    - ✓ Diabetes mellitus.
    - ✓ Systemic Lupus Erythematosus (SLE).
    - ✓ Amyloidosis.
- **What are the glomerular barriers which do not allow blood proteins to enter urine (image-2)?**
  - Endpothelial cells with fenestrations.
  - Glomerular Basement Membrane (GBM).
  - Podocytes foot processes.

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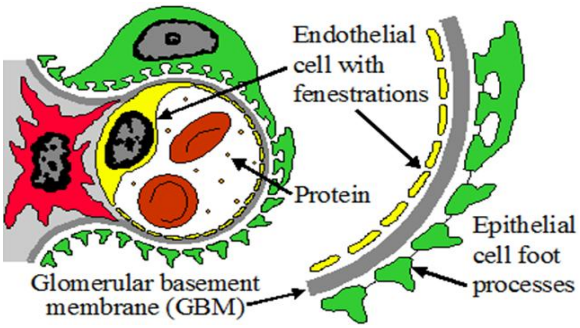
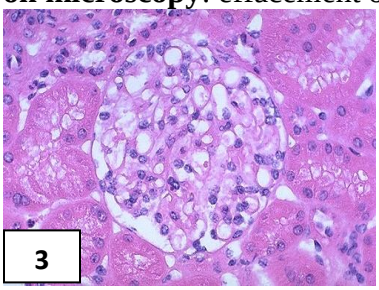


- **Minimal change disease (lipoid nephrosis):**
  - It is the major cause of nephritic syndrome in **children**.
  - **Light microscopy**: normal glomeruli – image (3) (lipid may be seen in PCT cells).
  - **Immunofluorescence**: negative.
  - **Electron microscopy**: effacement of foot processes (image-4).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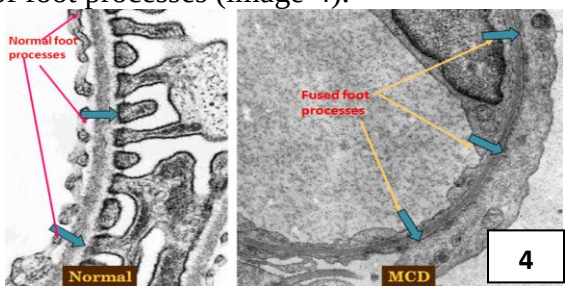

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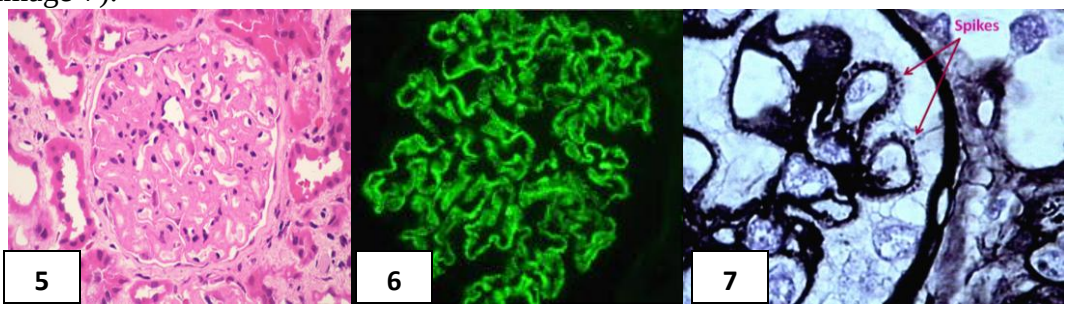
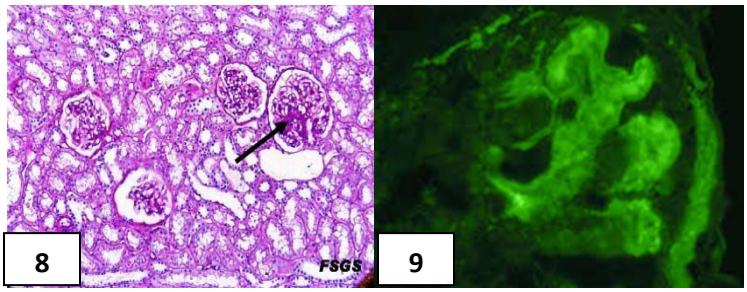
  - **This condition is triggered by:**
    - ✓ Recent infection.
    - ✓ Immunization.
    - ✓ Immune stimulus.
  - It is associated with Hodgkin lymphoma.
  - **Excellent response to corticosteroids.**

- **Membranous nephropathy:**
  - It is the most common cause of primary nephritic syndrome in **Caucasian adults.**
  - **It is characterized by the following:**
    - ✓ Non-selective proteinuria.
    - ✓ Microscopic hematuria.
    - ✓ Hypertension.
  - **Light microscopy**: diffuse capillary and GBM thickening (image-5).
  - **Immunofluorescence**: granular as a result of immune complex deposition (composed of IgG and C3) – image (6).
  - **Electron microscopy**: "spike and dome" appearance with subepithelial deposits (image-7).

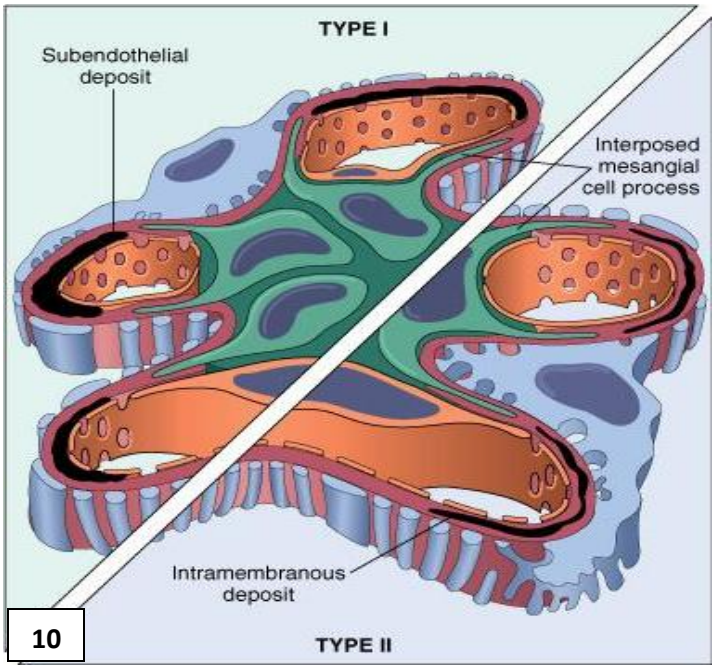


  - **Usually this condition is idiopathic but it can be associated with:**
    - ✓ Drugs (NSAIDs).
    - ✓ Infections (HBV, HCV).
    - ✓ SLE.
  - **Poor response to steroid therapy (may progress to chronic renal disease).**
- **Focal Segmental Glomerulo-Sclerosis (FSGS):**
  - **Definition**: sclerosis of some but not all glomeruli (<50%) and involving only a part of the affected glomeruli (segmental).
  - It is the most common cause of nephritic syndrome in **African Americans and Hispanics.**
  - **It can be idiopathic or associated with:**
    - ✓ HIV infection.
    - ✓ Sickle cell disease.
    - ✓ Heroin abuse.
    - ✓ Massive obesity.
  - **Light microscopy**: segmental sclerosis and hyalinosis (image-8).
  - **Immunofluorescence**: non-specific trapping of serum proteins in the sclerosed area (image-9).
  - **Electron microscopy**: effacement of foot processes similar to minimal change disease.



  - **Inconsistent response to steroid therapy (استجابة غير متناسقة).**
  - May progress to chronic renal disease.

- **Membranoproliferative glomerulonephritis (image-10):**
  - It is a nephritic syndrome that can also present with nephritic syndrome.
  - **There are two types:**
    - ✓ Type-I:
      - ❖ It is associated with: HBV, HCV. It may also be idiopathic.
      - ❖ It is characterized by subendothelial immune complex (IC) deposits with granular immunofluorescence; "tram-track" appearance due to GBM splitting caused by mesangial ingrowth.
    - ✓ Type-II:
      - ❖ It is associated with C3 nephritic factor (↓ serum C3 levels).
      - ❖ It is characterized by intrammebranous (IC) deposits.



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