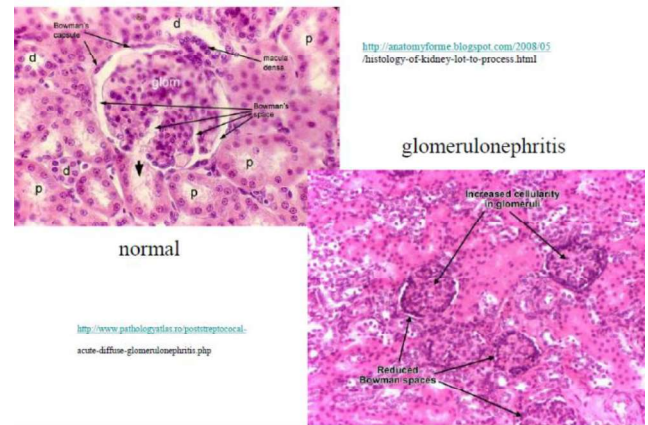


## CLINICAL SIGNS:

- High blood pressure (less plasma leaves capillary => greater blood volume => hypertension)
- Decreased urine output
- Analysis of urine + blood
  - Haematuria + presence of RBC casts
  - Proteinuria
  - Azotaemia: elevated blood urea/elevated levels of nitrogen-containing compounds

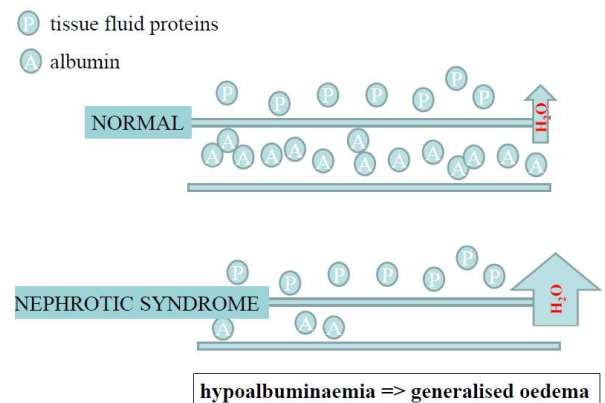


## ACUTE NEPHRITIC SYNDROME

- Syndrome = particular pattern of symptoms + signs in a presenting patient. It is not the disease itself. Several diseases may be under the “umbrella” of a syndrome
- With difference occurrences of glomerulonephritis – **acute nephritic syndrome** is a set of signs/symptoms that are result of blockage + damage to walls of glomerular capillaries
- Clinical presentation:
  - Sudden onset of haematuria
  - Oliguria
  - Oedema
  - Hypertension

## NEPHROTIC SYNDROME

- Syndrome where principle sign = **increased glomerular permeability to protein.**
- Diagnosis:
  - Substantial proteinuria → >3.5g/day
- Accompanied with:
  - Hypoalbuminaemia + generalised oedema
  - Lipiduria
  - Hyperlipidaemia → in this case is an elevated triglycerides and LDL-cholesterol possibly due to elevated lipoprotein production by liver



## MECHANISMS:

Substantial modifications to architecture of filtration membrane → leading to defects in filtration

- Primary (inherited) defects e.g. minimal change disease → where foot-shaped processes of podocytes (the visceral cells of the Bowman's capsule) are absent
- Secondary defects e.g. associated with autoimmune disease like systemic lupus erythematosus; or associated with diabetes mellitus

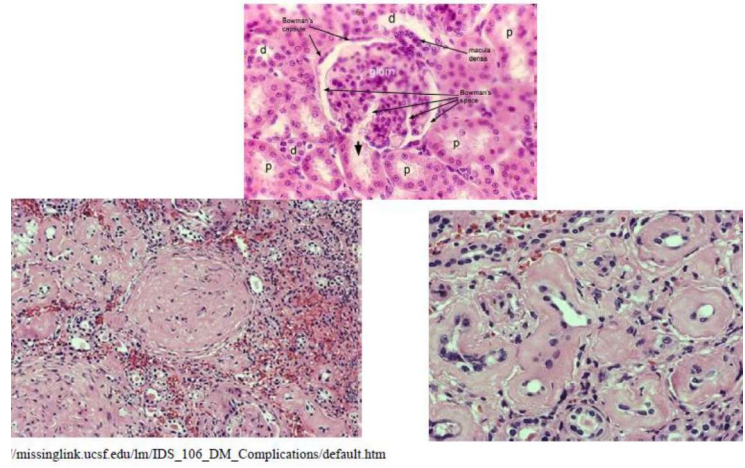
## DIABETIC GLOMERULOSCLEROSIS

Revision of Mesangial Cells:

- Network of fibres and cells surrounds glomerulus + holds the structure together: **the mesangium**
- Several types of **mesangial cells**
  - Phagocytic cells: engulf material that can pass through the fenestrations but not through the filtration slits
  - Contractile: reduce surface area of glomerulus available for filtration

## DIABETIC GLOMERULOSCLEROSIS

- High prevalence of nephropathy in diabetes mellitus patients
- Glomerulus most common site for such changes
  - Increased BM collagen production (“sclerosis”)
  - Expansion of area occupied by **mesangial cells**
- Early stage modifications to filtration membrane → results in an increased GFR + increased permeability to protein
- Mesangial cells proliferate → reduction in surface area of glomerulus available for filtration
- Loss of nephrons as disease progresses
- As disease progresses GFR decreases



## DIABETIC GLOMERULOSCLEROSIS: MICROALBUMINURIA

- The microalbuminuria test → measures amount of albumin in urine
- Early stages of disease: microalbuminuria
  - 24hr urine albumin excretion of 30 to 300mg

### **KEY POINTS:**

- Disease of glomerulus → modify filtration function
  - Vital materials (protein, blood + lipids) may be lost
  - Wastes **may be** retained
- Manifestations of glomerular disease reflect these defects in filtering function as measured by urine output, clearance + blood levels of nitrogenous wastes + presence of vital materials in urine
- Glomerulonephritis involves changes to glomerular function wrought by inflammatory damage
- Nephrotic syndrome – specific set of signs + symptoms which are manifestations of dramatic  $\wedge$  in permeability to proteins
- Serious complication of diabetes are changes in glomerular (and tubular) function and these may become progressively worse

### CHRONIC KIDNEY DISEASE:

- Result of irreversible renal damage – progress over several years
  - Progressive decline in renal function
  - Progressive drop in GFR + other signs of failures in renal function
- Humans endowed with 2.5 million nephrons
  - With nephron loss – surviving nephrons manifest an increase in activity
- **Progressively declining in someone without symptoms**
- Symptoms + signs can manifest when GFR <50%; renal function can drop as low as 10% of normal + remain undiagnosed
  - 90% loss = not possible to prevent disease worsening

## RISK FACTORS FOR CKD

- Hypertension (15% of new cases in Australia)
- Diabetes (34% of new cases in Australia)
- Smoking
- BMI  $\geq 30$
- Family history of chronic disease
- Being over 50 years age
  - Cluster of risk factors (aswell as others) means Indigenous are at high risk)