



## SNS COLLEGE OF PHARMACY AND HEALTH SCIENCES

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### CHRONIC RENAL FAILURE

#### DEFINITION

It is a condition involving a decrease in the kidneys ability to filter waste and fluid from the blood.  
Chronic renal failure means, a condition long lasting for a longer period of time and it is irreversible.

#### EPIDEMIOLOGY

About 1 in 10 people are affected with Chronic kidney Disease.  
1 lakh deaths are seen globally.

#### ETIOLOGY

- Acute Renal failure
- Hypertension
- Diabetes
- Kidney Disease

#### PATHOGENESIS

##### Acute Renal failure

- Pre-renal
- Intra-renal
- Post-renal

##### Hypertension

Hypertension in arteriole causes thickening and narrowing of arteries.  
Which increase pressure in the arteries, leads to decreased blood flow and decreased GFR.  
Decreased GFR activate Renin Angiotensin system (RAS) in kidneys  
RAS activation increase Renin synthesis which leads to increase in Blood pressure.  
Then, due to ischemic injury there will be a Nephron loss.

##### Diabetes

Most common cause is diabetic nephropathy.  
Which leads to chronic renal failure.  
Due to failure in glomeruli.  
Mesangial expansion  
Mesangial cell proliferation  
Podocytopathy  
Hypertrophy and atrophy of podocytes  
Glomerular basement membrane thickening and sclerosis.

##### Mesengial expansion

The expansion of mesangial matrix is one characteristic of diabetic nephropathy although it also involves other cells in interaction including podocytes and endothelial cells.

Mesangial expansion occurs due to increased deposition of extracellular matrix proteins, for example fibronectin, into the mesangium.

### **Mesangial cell proliferation**

Aberrant proliferation of mesangial cells (MCs) is a common finding in a number of diseases that can lead to end-stage renal failure.

### **Podocytopathy**

The podocyte is a key cell that forms the last barrier of the kidney filtration unit.

Hypertrophy

Atrophy

Glomerular basement membrane thickening

Diabetic glomerulosclerosis is a thickening of the basement membrane, which can become up to 4-5 times thicker than normal.

Hypertension and

Diabetes

Increase Reactivate oxygen species production which then increase growth factors and pro-inflammatory cells in glomeruli.

### **Irreversible loss of Nephron**

Glomerular hyperfiltration

Increase GFR in early stage

Leads to glomerular necrosis

In late stage,

Decrease GFR

Decrease urine output

Uremia

### **Clinical manifestations**

#### **Na and water balance:**

Decrease GFR increases Na and water retention

Increase blood pressure

Causes peripheral edema.

#### **Potassium balance:**

Decrease GFR increases Potassium retention leads to hyperkalemia which causes muscle weakness.

Loss of Nephron leads to decreased Renin synthesis.

Decreased Renin decreases Aldosterone

Which increase Potassium retention

#### **Metabolic acidosis**

Increased acid level in blood.

#### **Mineral balance and osteodystrophy**

Loss of Nephron cause decreased calcitriol

Decreased calcitriol decrease calcium absorption

Decreased calcium absorption leads to hypocalcemia.

Decreased calcitriol and hypocalcemia leads to hyperparathyroidism.  
Hyperparathyroidism leads to osteodystrophy