CHRONIC RENAL FAILURE

Impairment of normal kidney function is referred to as renal insufficiency.

Chronic kidney disease also called chronic renal insufficiency Progressive loss of function occurring over several months to years.

It is characterized by the gradual replacement of normal kidney architecture with interstitial fibrosis.

PROGRESSION AND NOMENCLATURE OF CRF

Stage	Description	GFR mL/min	Urine production
1	Normal/ diminished renal reverse	**120-90**	Normal or mild polyuria
2	Early CRF/ Renal impairment	**90-60**	Usually polyuria
3	Moderate CRF/ Early renal failure	**60-30**	Oliguria
4	Severe CRF/Pre-end stage renal failure	**30-15**	Oliguria
5	End stage renal failure	**<15**	Oliguria/ anuria

CAUSES

- Glomerulonephritis
- Diabetes
- Multisystem disease
- Tumor, miscellaneous (SLE, gout, TB, Sickle cell disease, etc.,)
- HTN
- Pyelonephritis
- Congenital (including polycystic)
- Drug nephrotoxicity
- Interstitial nephritis
- Unknown

RISK FACTORS

Susceptibility

- Advanced age
- Reduced kidney mass and low birth weight
- Racial/ethnic minority
- Family history
- Low income or education
- Systemic inflammation
- Dyslipidemia

Initiation

- Diabetes mellitus
- Hypertension
- Autoimmune disease
- Polycystic kidney disease
- Drug toxicity

Progression

- Glycemia (among diabetic patients)
- Elevated blood pressure
- Proteinuria
- Smoking

SIGNS

- **Cardiovascular:** Left ventricular hypertrophy, hyperhomocysteinemia, dyslipidemia, palpitation, arrhythmia, ECG changes, elevated creatine kinase, worsening HTN and edema.
- **Musculoskeletal:** Cramping and muscle pain.
- **Neuropsychiatric:** Depression, anxiety, sexual dysfunction, fatigue, impaired mental cognition.
- **Gastrointestinal:** Constipation, nausea, vomiting, GI bleeding, gastroesophageal reflux disease.

SYMPTOMS

Classic symptoms associated with stage 5 CKD include,

- Pruritus
- Dysgeusia
- Nausea
- Vomiting
- Bleeding abnormalities

Symptoms associated with anemia include,

- Cold intolerance
- Shortness of breath
- Fatigue

❖ The severity of the symptoms is related to the rate of anemia development and the degree of hemoglobin reduction.

PATHOPHYSIOLOGY

The majority of progressive nephropathies share a common pathway.

The key elements pathway are

- Loss of nephron mass
- Glomerular capillary HTN
- Proteinuria

Presence of or **exposure** to the **initiation risk factors**

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Loss of nephron mass

↓

Remaining nephrons hypertrophy to compensate for the loss

↓

Initially compensatory hypertrophy may be adaptive

↓

Then it becomes maladaptive and leads to the **development of glomerular HTN**, possibly mediated by angiotensin II

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Angiotensin II ,a potent vasoconstrictor of both the afferent and efferent arterioles

↓

Affects the efferent arterioles

Increased glomerular capillaries pressure

↓

Development of **intraglomerular HTN** correlates with the development of systemic arterial HTN

↓

Results in **albuminuria and Proteinuria**

↓

Accelerate the **progressive loss of nephrons** due to direct cellular damage

↓

Presence of proteins in the renal tubule activate tubular cells

↓

Loss of structural nephron units and **reduced GFR .**

Upregulated **production of inflammatory and vasoactive cytokines**

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Intratubular complement activation

↓

Damage in the progressive **proteinuric nephropathies**

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Scarring of the interstitium

↓

Progressive loss of structural nephron units and reduced GFR

DIAGNOSIS

- Serum creatinine measurement,
- Urine analysis,
- Renal biopsy,
- Ultrasound and imaging studies of kidneys.