
# Approach to Patients with Chronic Kidney Disease



Dr Reyhane Motamedi Fard

Assistant Professor Of Nephrology

Isfahan University Of Medical Sciences

# INTRODUCTION

- Decreased kidney function shown by glomerular filtration rate (GFR) of less than 60 mL/min per 1·73 m2, or markers of kidney damage, or both, of at least 3 months duration, regardless of the underlying cause

20th Edition HARRISONS principals of Internal Medicine. McGraw-Hill Education, 2018.1014-1020

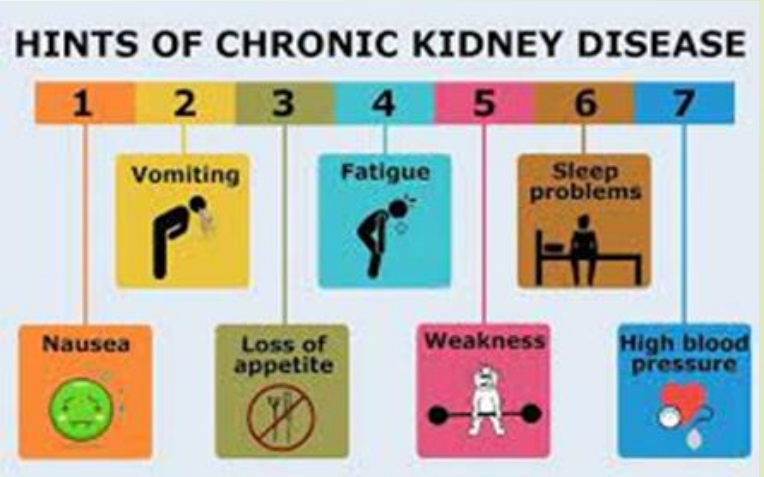
# INTRODUCTION…

- If duration is >3 months, CKD is confirmed
- If duration is not>3 months or unclear, CKD is not confirmed
- Patients may have CKD or acute kidney diseases (including AKI) or both and tests should be repeated accordingly

KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease

# Management of a patient with CKD

- Screening
- Etiologic diagnosis
- Staging of the CKD severity
- Identifying and managing patients at high risk of progression;
- Management of complications of CKD
- Preparing the patient for transplantation or renal replacement therapy



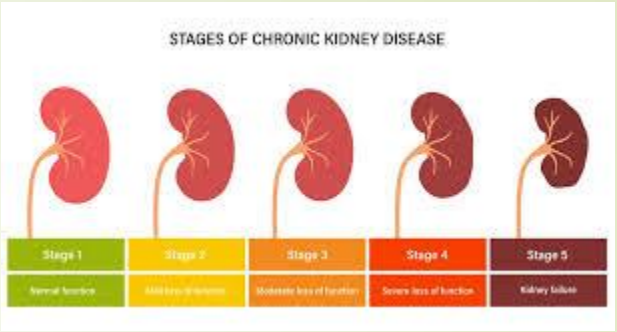
# Screening

- Monitoring for the presence of proteinuria and measurement of kidney function
- Screening should focus on patients with CKD risk factors

# RISK FACTORS

- Small for gestation birth weight
- Childhood obesity
- Hypertension
- Diabetes mellitus
- Autoimmune disease
- Advanced age
- African ancestry
- Family history of kidney disease
- A previous episode of acute kidney injury
- The presence of proteinuria, abnormal urinary sediment, or structural abnormalities of the urinary tract

# STAGINGOF CKD




- To stage CKD, it is necessary to estimate the GFR rather than relying on serum creatinin concentration
- Measurement of albuminuria is also helpful for monitoring nephron injury and the response to therapy in many form of CKD

**Prognosis of CKD by GFR and albuminuria categories: KDIGO 2012**

| GFR categories (ml/min/1.73 m²) description and range | | | | Persistent albuminuria categories description and range | | |
|---|---|---|---|---|---|---|
| | | | | A1 | A2 | A3 |
| | | | | Normal to mildly increased | Moderately increased | Severely increased |
| | | | | <30 mg/g <3 mg/mmol | 30–300 mg/g 3–30 mg/mmol | >300 mg/g >30 mg/mmol |
| | G1 | Normal or high | ≥90 | | | |
| | G2 | Mildly decreased | 60–89 | | | |
| | G3a | Mildly to moderately decreased | 45–59 | | | |
| | G3b | Moderately to severely decreased | 30–44 | | | |
| | G4 | Severely decreased | 15–29 | | | |
| | G5 | Kidney failure | <15 | | | |

# Urinary protein measurement

- Normoalbuminuria is defined as <30 mg/g (<3 mg/mmol)
- Microalbuminuria as 30–300 mg/g (3–30 mg/mmol)
- Macroalbuminuria as >300 mg/g (>30 mg/mmol)

# TABLE 1.1 Limitations of Urine Dipstick

**False Negatives**

Low urine-specific gravity (≤1.010)
High urine salt concentration
Acidic urine
Nonalbumin proteinuria

**False Positives**

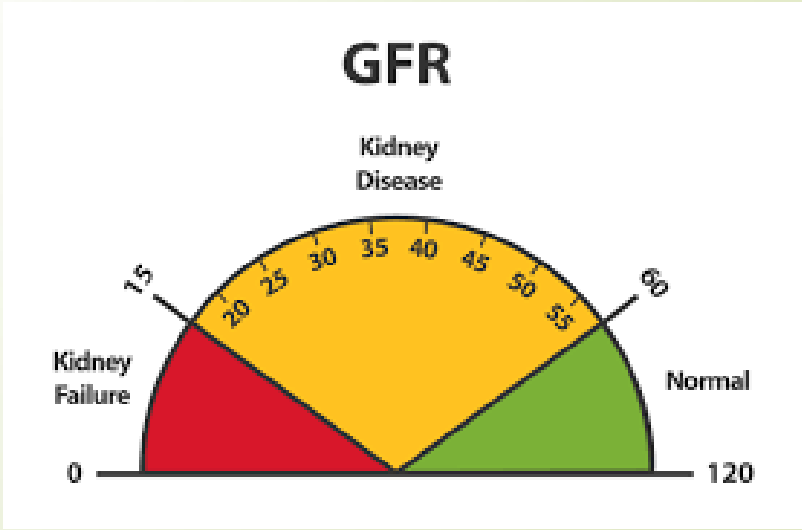
Presence of blood or semen
Alkaline urine
Detergents/disinfectants
Radiocontrast agents
High urine-specific gravity (>1.030)

# Measurement of kidney function

- Cockcroft–Gault equation:

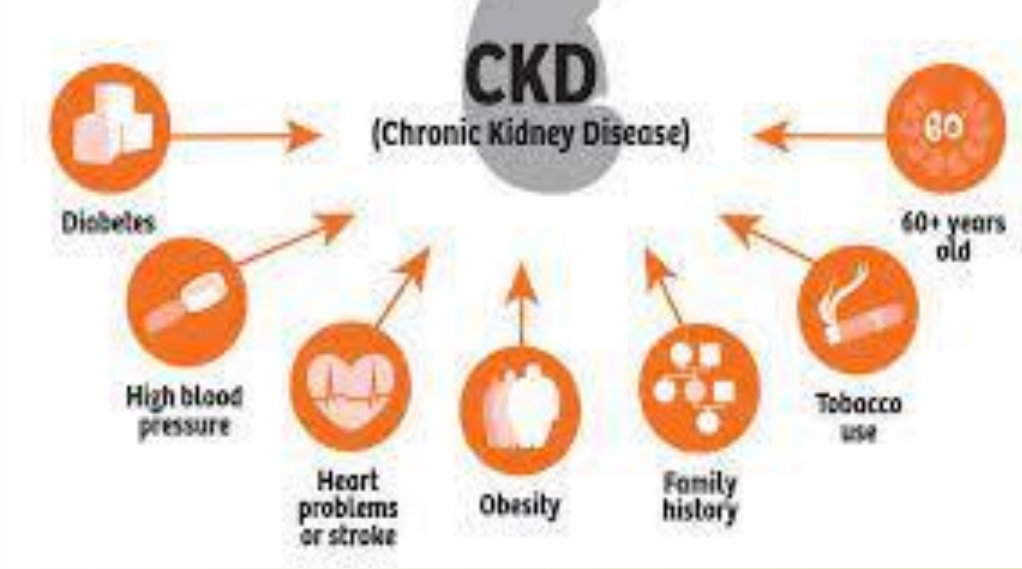
$$\text{Estimated } C_{Cr} = (140 - \text{Age}) \times (0.85 \text{ if female}) \times (\text{W in kg}) / (72 \times S_{Cr} \text{ in mg/dL})$$

- Modification of Diet in Renal Disease (MDRD) equation
- The CKD-EPI GFR equation
- Cystatin C equations



# Slowing Progression Of CKD






- Cessation of smoking
- Control of blood pressure and proteinuria
- Cardioprotective effects
- Strict glycemic control in diabetic patients with CKD
- Lipid-lowering therapy
- Protein restriction

# Control of blood pressure

- The target blood pressure recommended by KDIGO and KDOQI is <130/80 mm Hg for all patients with kidney disease
- JNC 8 guidelines published in 2013 recommend a less aggressive blood pressure target of <140/90 mm Hg in patients under age 60 with diabetes and kidney disease

# Control of proteinuria

Whether or not hypertension is present, use of (ACE-I/ARB) is recommended to slow the rate of progression in patients with proteinuria (spot urine protein-to-creatinine ratio of ≥200 mg/g)

# Strict glycemic control in diabetic patients with CKD

- Tight glycemic control slows the rate of progression of renal disease in diabetic patients with CKD
- The goal of glycemic control should be a HbA1C of <7.0%, although the latest ADA guidelines have emphasized individualization of the HbA1C threshold in patients with type 2 diabetes

# Lipid-lowering therapy


- The 2013 KDIGO lipid guidelines recommend that all CKD patients not on dialysis and ≥50 years of age be treated with either a statin or a statin/ezetimibe combination
- Younger CKD (age 18–49) not on dialysis should be treated with statins if they have known coronary disease, diabetes mellitus, prior ischemic stroke, or a 10-year CV risk greater than 10%

# Lifestyle

- People with CKD be encouraged to undertake physical activity compatible with cardiovascular health and tolerance (aiming for at least 30 minutes 5 times per week), achieve a healthy weight
- (BMI 20 to 25, according to country specific demographics), and stop smoking

KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease

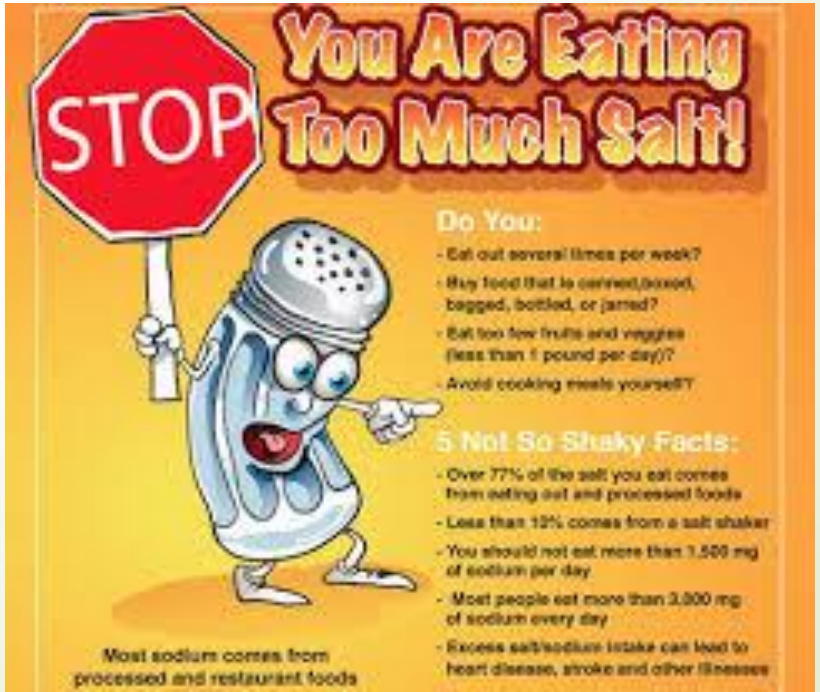
# Protein intake

- We suggest lowering protein intake to 0.8 g/kg/day in adults with diabetes or without diabetes and GFR <30 ml/min/ 1.73 m2 (GFR categories G4-G5), with appropriate education
- We suggest avoiding high protein intake (>1.3 g/kg/day) in adults with CKD at risk of progression

KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease

# Salt intake

- We recommend lowering salt intake to <90mmol (<2 g) per day of sodium (corresponding to 5 g of sodium chloride) in adults




KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease

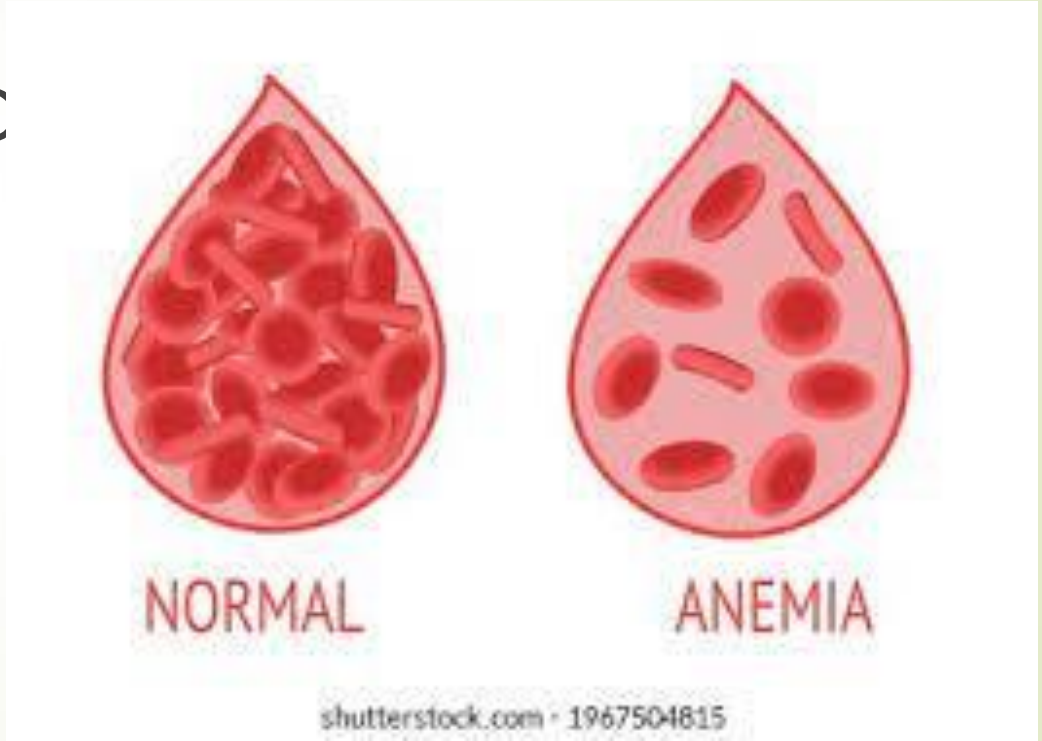
# Management Of Complications Of CKD

- Correction of anemia
- Correction of iron deficiency
- Chronic Kidney Disease-Mineral and Bone Disorder (CKD-MBD)
- Electrolyte and acid–base complications

# Anemia

## The most commc

- Erythropoietin deficiency
- Iron deficiency
- Inflammation



# Initiation of ESA therapy and Hb thresholds

- KDIGO guidelines recommend that erythropoietin therapy should not be started until the hemoglobin falls below 10 g/dL (100 g/L)
- KDIGO guidelines recommend to maintain the hemoglobin level between 9 and 11.5 g/dL (90 and 115 g/L)

# Correction of iron deficiency

- Serum ferritin <100 ng/mL)
- The transferrin saturation <20% is indicative of low iron availability in CKD
- Iron deficiency can lead to decreased effectiveness of ESA therapy, and iron therapy without ESA therapy is usually unsuccessful in patients with CKD

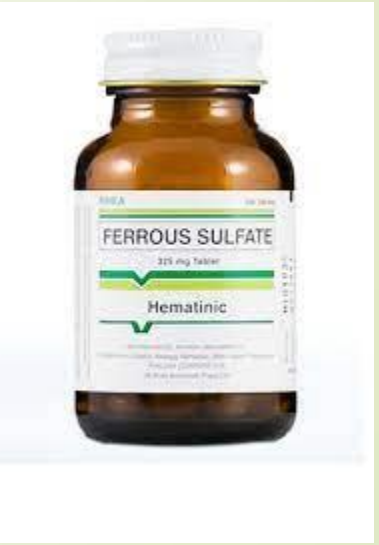
# Treatment of iron deficiency anemia

- Oral iron therapy is the preferred method of treating nondialysis CKD patients and is recommended by KDIGO as an initial approach to treating iron deficiency.
- Strategies to improve oral iron absorption include only taking pills on an empty stomach, avoiding enteric-coated formulations, and avoiding ingestion of iron with phosphate binders
- Intravenous iron may be needed in some patients who either do not respond to oral iron or have large ongoing losses of iron

# Treatment of iron deficiency anemia

## Dosing strategies:

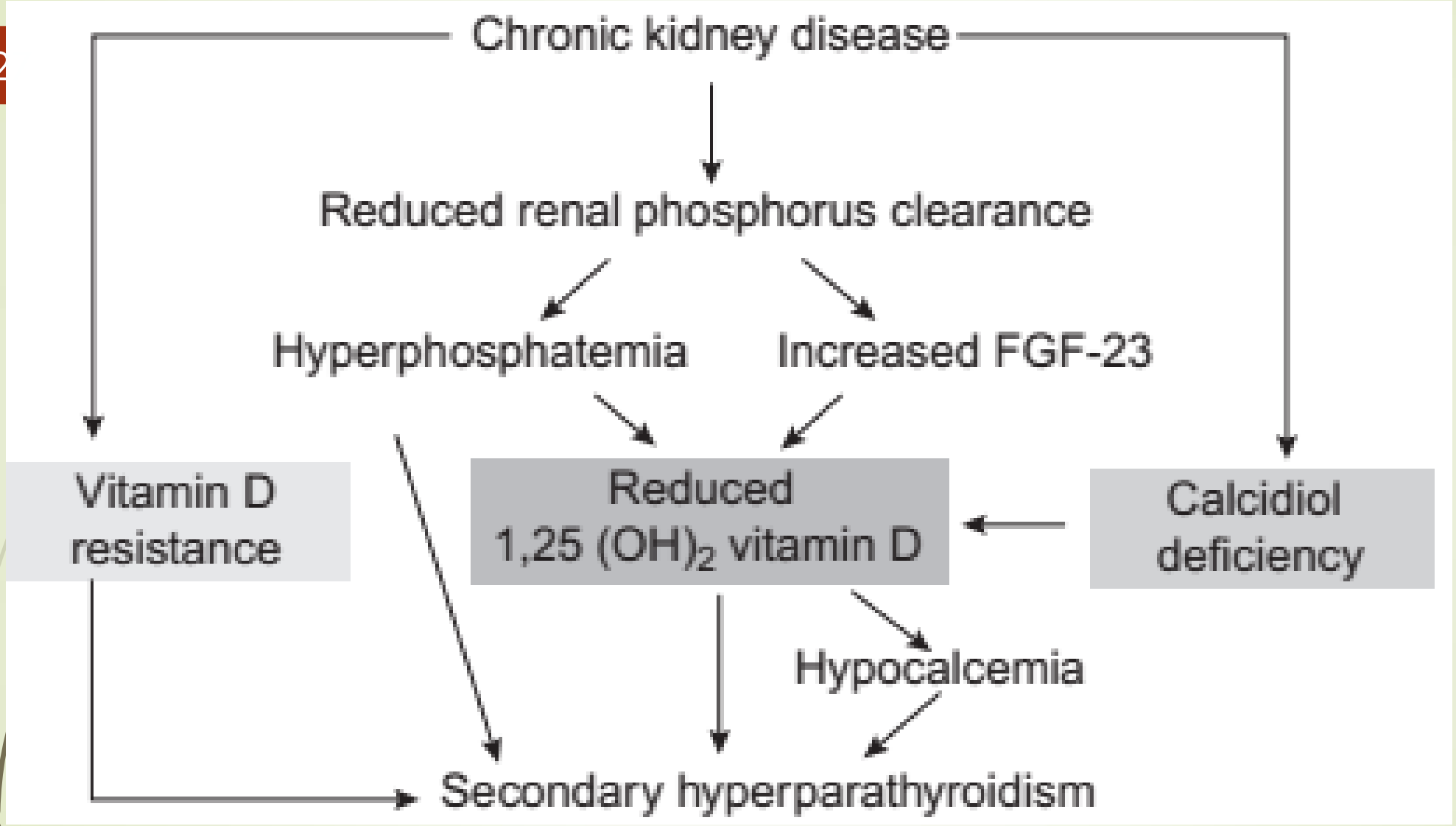
- Approximately 200 mg of elemental iron daily, which is equivalent to ferrous sulfate 325 mg three times daily; each pill providing 65 mg of elemental iron
- If iron repletion ,goals are not met after a 1–3 month trial, it is c consider intravenous iron supplementation



# Treatment of iron deficiency anemia

## Dosing strategies:

- The initial course of intravenous iron treatment is to supply approximately 1,000 mg of iron
- This may be repeated if the initial course of treatment fails to increase Hb level and/or decrease ESA dose
- Iron status should be monitored every 3 months with TSAT and ferritin while a patient is receiving ESA therapy



# Hyperphosphatemia


1. Dietary management.
   - Phosphorus intake should be restricted to 800–1,000 mg per day
2. Target serum calcium and phosphorus levels
   - keeping serum calcium toward the middle or low range of normal, to minimize the risk of vascular calcification. Similarly serum phosphorus levels should be maintained within the normal range
3. Phosphorus binders

# Serum parathyroid hormone levels

## Target range of PTH

- In dialysis patients a target PTH range of 2–9 times normal is proposed
- For nondialysis CKD, assay-specific elevated levels of PTH be investigated, and treated with vitamin D if found to be persistently high and/or increasing

# Serum parathyroid hormone levels

## Frequency of measurement

- Every 12 months for eGFR/1.73 m2 values between 30 and 45–60 mL/min
- Every 3 months when eGFR/1.73 m2 is between 15 and 30 mL/min

# Serum alkaline phosphatase

- The current KDIGO CKD-MBD guidelines recommend at least yearly monitoring of serum alkaline phosphatase levels for stage 4 CKD and higher

# Vitamin D


- In CKD patients, 25-D levels are quite low, probably because of lack of sunlight exposure and low ingestion of vitamin D–containing foods
- As CKD progresses, the rate of conversion of 25-D to 1,25-D by the 1-a-hydroxylase enzyme diminishes, and even with adequate 25-D levels, serum 1,25-D levels may be reduced and PTH suppression may be inadequate

# Cinacalcet


- Cinacalcet is a calcimimetic drug that increases the sensitivity of calcium receptors on the parathyroid gland
- One main advantage of cinacalcet is its use in patients with hyperparathyroidism and high serum calcium and/or phosphorus levels, where use of active vitamin D sterols to suppress PTH would be contraindicated (active vitamin D sterols increase GI absorption of phosphorus and may worsen hyperphosphatemia).

# Electrolyte and acid–base complications

- The most prominent is hyperkalemia
- Acidosis can also develop although it is generally mild and usually with a normal anion gap until kidney function is severely impaired
- The use of sodium bicarbonate is recommended to maintain the serum bicarbonate level at ≥22 mmol/L

# Preparation for Transplantation, Dialysis, or Conservative Care

- Once a patient has reached stage 4 CKD with (eGFR/1.73 m2) of <30 mL/min, he or she should be under a nephrologist's care
- The patient should also be a part of a multidisciplinary predialysis program that includes patient and family education, early choice of appropriate renal replacement modality
- If dialysis is being considered, elective creation of dialysis access

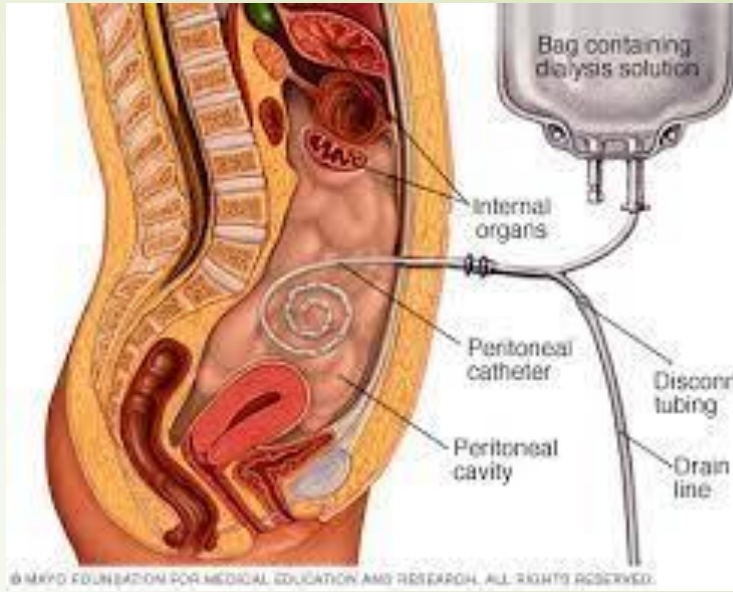
# Referral To Nephrologists

- Patients with CKD should be referred to a nephrologist when the estimated glomerular filtration rate (eGFR) is <30 mL/min/1.73 m2 in order to discuss and potentially plan for kidney replacement therapy.
- referral to the nephrologist is considered late if it is within one to six months of the requirement for kidney replacement therapy

# Choice Of Modality

- Preemptive transplantation
- Hemodialysis
- Peritoneal dialysis
- The option not to dialyze: Palliative care

# Peritoneal dialysis




1. Infants or very young children
2. Patients with severe cardiovascular disease
3. Patients with difficult vascular access (e.g., diabetic patients)
4. Patients who desire greater freedom to travel
5. Patients who wish to perform home dialysis but do not have a suitable partner to assist them

# Dialysis Access Placement Issues

- A lead time of at least 6 months prior to anticipated dialysis may allow correction of suboptimal flow or placement of a second fistula in the event that the initial fistula does not function properly
- For PD, a peritoneal catheter should be in place at least 2 weeks prior to the anticipated start of dialysis

# Indications for kidney replacement therapy

- Pericarditis or pleuritis (urgent indication)
- Progressive uremic encephalopathy or neuropathy, with signs such as confusion, asterixis, myoclonus, wrist or foot drop, or, in severe, cases, seizures (urgent indication)
- A clinically significant bleeding diathesis attributable to uremia (urgent indication)
- Fluid overload refractory to diuretics

# Indications for kidney replacement therapy …

- Hypertension poorly responsive to antihypertensive medications
- Persistent metabolic disturbances that are refractory to medical therapy
  - These include hyperkalemia, hyponatremia, metabolic acidosis, hypercalcemia, hypocalcemia, and hyperphosphatemia
- Persistent nausea and vomiting
- Evidence of malnutrition

با تشکر فراوان از حسن توجه شما عزیزان