HYPOKALAEMIA

Pathophysiology.

- Defined as a serum $K^+ < 3.5$mmol/L.
- Most common causes are intracellular shifts & increased losses.

BOX 123-5 CAUSES OF HYPOKALEMIA

- Decreased intake
  - Decreased dietary potassium
  - Impaired absorption of potassium
  - Clay ingestion
  - Kayexalate
- Increased loss
  - Renal
    - Hyperaldosteronism
      - Primary
        - Conn's syndrome
        - Adrenal hyperplasia
      - Secondary
        - Congestive heart failure
        - Cirrhosis
        - Nephrotic syndrome
        - Dehydration
      - Bartter's syndrome
    - Glycyrrhizic acid (licorice, chewing tobacco)
    - Excessive adrenocorticosteroids
      - Cushing's syndrome
      - Steroid therapy
      - Adrenogenital syndrome
    - Renal tubular defects
      - Renal tubular acidosis
      - Obstructive uropathy
      - Salt-wasting nephropathy
    - Drugs
      - Diuretics
      - Aminoglycosides
      - Mannitol
      - Amphotericin B
      - Cisplatin
      - Carbenicillin
  - Gastrointestinal
    - Vomiting
    - Nasogastric suction
    - Diarrhea
    - Malabsorption
    - Ileostomy
    - Villous adenoma
    - Laxative abuse
  - Increased losses from skin
    - Excessive sweating
    - Burns
- Transcellular shifts
  - Alkalosis
    - Vomiting
    - Diuretics
    - Hyperventilation
    - Bicarbonate therapy
  - Insulin
    - Exogenous
    - Endogenous response to glucose
  - $Beta_2$-agonists (albuterol, terbutaline, epinephrine)
  - Hypokalemic periodic paralysis
    - Familial
    - Thyrotoxic
- Miscellaneous
  - Anabolic state
  - Intravenous hyperalimentation
  - Treatment of megaloblastic anemia
  - Acute mountain sickness

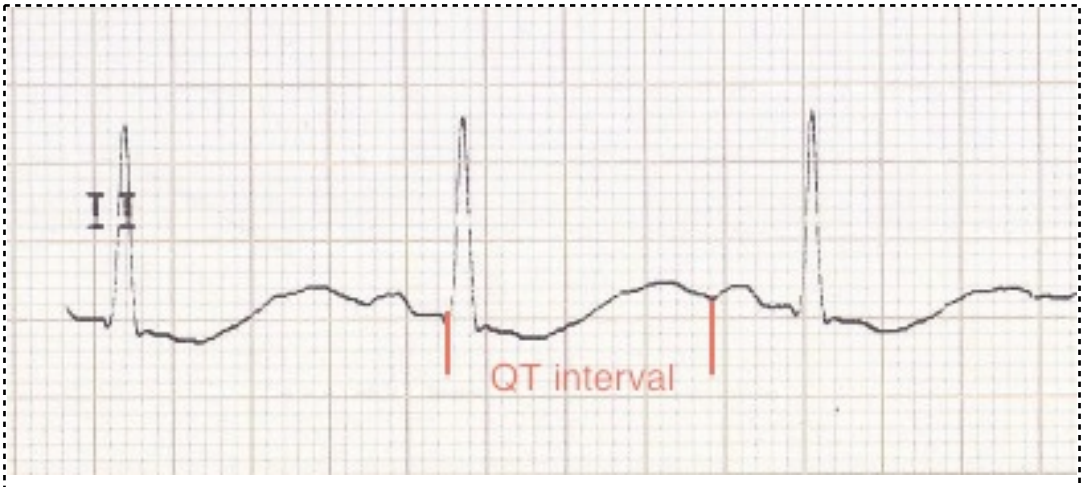
Clinical Features.

Typically start w/ serum $K^+ < 2.5$mmol/L.

Table 21-10 Symptoms and Signs of Hypokalemia
Cardiovascular
Hypertension
Orthostatic hypotension
Potentiation of digitalis toxicity
Dysrhythmias (usually tachydysrhythmias)
T-wave flattening, U waves, ST depression
Neuromuscular
Malaise, weakness, fatigue
Hyporeflexia
Cramps
Paresthesias
Paralysis
Rhabdomyolysis

GI
Ileus
Renal
Increased ammonia production
Urinary concentrating defects
Metabolic alkalemia, paradoxical aciduria
Nephrogenic diabetes insipidus
Endocrine
Glucose intolerance

T wave inversion and prominent U waves in hypokalaemia



Apparent long QT interval with hypokalaemia (actually T-U fusion)

Management.

- Because K^+ is an ic.Cation, a low serum level reflects a much greater total K^+ deficit.
- This can surprisingly be in excess of 300+mmol deficit of K^+.
- Up to 50% of replaced potassium is excreted in urine.

- **Oral replacement.**
  - Potassium rich foods.
  - Salt-substitutes.
- **Intravenous replacement.**
  - 10mmol KCl over 30-60mins → cardiac monitoring required.
  - up to 40mmol can be added per liter of IV fluid.
  - >20mmol/hr ideally via central line.
  - Do *NOT* exceed 40mmol/hr.