# **HYPOKALEMIA**

### **DEFINITION:** Serum potassium level less than 3.6 mEq/L.

# INCIDENCE IN CRITICAL ILLNESS: Common.

## **ETIOLOGY:**

- Inadequate potassium intake.
- Increased potassium excretion:
  - > Gastrointestinal losses: Diarrhea; laxative and enema overuse.
  - Renal losses: Diuretics (loop and thiazides); metabolic alkalosis; osmotic diuresis (hyperglycemia); mineralocorticoid excess (primary hyperaldosteronism, congenital adrenal hyperplasia, glucocorticoid-responsive aldosteronism); penicillin and its synthetic derivatives; hypomagnesemia (caused by aminoglycosides, amphotericin B, cisplatin, foscarnet); high-dose glucocorticoids; renal tubular acidosis (type 1 and some type 2); Liddle disease; Bartter syndrome; congenital enzyme deficiencies.
- Shift of potassium into cells: Medications (beta-adrenergic agonists [bronchodilators, decongestants, tocolytics], insulin, theophylline, caffeine, barium); delirium tremens (increased endogenous beta-adrenergic stimulation); hyperthyroidism; familial hypokalemic periodic paralysis.
- Dilution.

### **CLINICAL MANIFESTATIONS:**

- Most hypokalemic patients are asymptomatic.
- **Cardiovascular:** Patients with underlying cardiac disease or those taking digitalis are at increased risk of abnormal cardiac electrical activity progressing to cardiac arrest; characteristic deterioration of ECG changes (flat T waves, ST depression, U waves, QT interval prolongation); ventricular arrhythmias.
- **Neuromuscular:** Generalized weakness; muscle necrosis; rhabdomyolysis; ascending muscle paralysis (respiratory failure and arrest).

#### **TREATMENT:**

- Potassium repletion: Potassium chloride or potassium phosphate; intravenous or enteric.
- Serum potassium level < 3.0 mEq/L: IV repletion in a monitored setting.
- **Magnesium repletion:** 8-10 gm of magnesium is often required to correct a serum potassium level of < 3.0 mg/dL.
- Serum potassium decreases by 0.3 mEq/L for each 100 mEq decrease in total body potassium.

#### **KEY REFERENCES:**

- Gennari FJ. Hypokalemia. N Engl J Med 1998;339:451-458.
- Schulman M, Narins RG. Hypokalemia and cardiovascular disease. *Am J Cardiol* 1990;65:4E-9E.
- Buckley MS, LeBlanc JM, Crawley MJ. Electrolyte disturbances associated with commonly prescribed medications in the intensive care unit. *Crit Care Med* 2010;38(Suppl):S253-264.