

## **HYPERPHOSPHATEMIA**

**DEFINITION:** Total serum phosphate levels greater than 4.5 mg/dL.

**INCIDENCE IN CRITICAL ILLNESS:** Uncommon in the absence of renal failure.

### **ETIOLOGY:**

- **Renal failure.**
- **Increased renal resorption of phosphate:** Hypoparathyroidism; thyrotoxicosis.
- **Cellular injury:** Rhabdomyolysis; tumor lysis syndrome; hemolysis.
- **Medication related:** Laxative abuse; bisphosphonate therapy (causes decreased renal phosphate clearance).

### **CLINICAL MANIFESTATIONS:**

- **Related to hypocalcemia,** which is caused by hypophosphatemia via: 1) precipitation of calcium, 2) interference with PTH-mediated bone resorption, and 3) decreased Vitamin D levels.
- **Cardiovascular:** Hypotension; cardiac dysrhythmias.
- **Neuromuscular:** Muscle cramping; tetany; hyperreflexia; seizures.

### **TREATMENT:**

- **Plasma volume expansion + diuresis (acetazolamide).**
- **Renal replacement therapy.**
- **Oral phosphate binders:** Chronic renal failure; patients with acute renal failure who are receiving enteral nutrition with a high phosphate concentration (if the formula cannot be changed without sacrificing optimization of protein administration).

### **KEY REFERENCES:**

- Huang C-L, Moe OW. Clinical assessment of phosphorus status, balance and renal handling in normal individuals and in patients with chronic kidney disease. *Curr Opin Nephrol Hypertens* 2013;22:452-458.
- Wilson FP, Berns JS. Onco-nephrology: Tumor lysis syndrome. *Clin J Am Soc Nephrol* 2012;7:1730-1739.
- Sutters M, Gaboury CL, Bennett WM. Severe hyperphosphatemia and hypocalcemia: A dilemma in patient management. *J Am Soc Nephrol* 1996;7:2056-2061.