HYPERMAGNESEMIA

DEFINITION: Total serum Mg^{2+} levels greater than the normal range (1.5-2.3 mg/dL).

INCIDENCE IN CRITICAL ILLNESS: Rare in the absence of tocolysis.

ETIOLOGY:

- **Decreased renal excretion of magnesium:** Renal failure; lithium therapy; hypocalcuric hypercalcemia.
- **Excessive intake:** Tocolysis; antacids; laxative abuse; magnesium cathartics used to treat overdoses; Epsom salts (100% magnesium sulfate).

CLINICAL MANIFESTATIONS:

- **Symptoms may occur with levels greater than 4.0 mg/dL.**
- **Cardiovascular:** Bradycardia; hypotension; complete heart block; cardiac arrest.
- **Metabolic:** Hypocalcemia (possibly due to inhibition of PTH release); hyperkalemia.
- **Neuromuscular:** Decreased deep tendon reflexes; muscle paralysis, including respiratory depression; lethargy, somnolence, confusion and coma; ileus; urinary retention; parasympathetic blockade causing fixed and dilated pupils.

TREATMENT:

- **There is no specific antidote for hypermagnesemia.**
- **Prevention:** Patients with renal failure should not be given magnesium containing antacids or cathartics.
- **Cardiac stabilization:** Intravenous calcium.
- **Enhancement of renal excretion:** Plasma volume expansion + furosemide.
- **Renal replacement therapy:** Intermittent hemodialysis corrects hypermagnesemia more rapidly than peritoneal dialysis or continuous renal replacement therapy.

KEY REFERENCES:

- Topf JM, Murray PT. Hypomagnesemia and hypermagnesemia. *Reviews in Endocrine & Metabolic Disorders* 2003;4:195-206.
- Cholst IN, Steinberg SF, Tropper PJ, et al. The influence of hypermagnesemia on serum calcium and parathyroid hormone levels in human subjects. *New Engl J Med* 1984;310:1221-1225.
- Wacker WEC, Parisi AF. Magnesium metabolism. *New Engl J Med* 1968;278(14):772-776.