

Electrolyte Disorders

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Treatment

- Hypokalemia
- Treat Underlying cause ABC's
- Supplement
- IV KCl increases serum K 10 meq to approx. 0.1 meq/L
- May supplement Mg and Ca as well
- Hyperkalemia
- Treat Underlying cause ABC's
- Calcium Gluconate
- Dextrose + Insulin
- HCO₃
- Kayexalate
- Dialysis

Potassium

- The major intracellular cation (3.5-5.3)
- Nerve impulse conduction (neuromuscular, skeletal/cardiac muscle contractions and other cardiac function)
- Avg. daily intake 60-100 meq/d (may need more)
- Serum levels are increased in cell destruction
- Na-K have a reciprocal relationship
- Na-K pump (ATP dependent)
- Na-K exchange pump in the kidney
- Cellular H-K exchange which varies with serum PH

Hypokalemia

- Hypomagnesemia
- Diaphoresis
- Vomiting/Diarrhea
- Intestinal suction
- Ileostomy
- Villous adenoma
- Laxative abuse
- Hepatic disease
- Alcoholism
- CHF
- Diuresis
- RTA
- D.M.
- Cushings disease
- Steroids
- Hyperaldosteronism
- Insulin
- Albuterol
- Epinephrine
- Aminoglycosides


Hyperkalemia

- Renal Failure
- Metabolic Acidosis
- Addison's Disease
- Hypoaldosteronism
- K-sparing diuretics
- Ace inhibitors
- Hemolysis
- Transfusion
(hemolyzed blood)
- Burns
- Sepsis
- Trauma
- Nsaids
- Beta Blockers
- Chemotherapy
- Iatrogenic

Sx&Sx EKG Findings

- Hypokalemia
- Muscle weakness
- Decreased GI motility/ileus
- Anorexia/NV
- Respiratory muscle paralysis
- Parasthesia
- Decreased DTR's
- Irregular pulse
- Dysrhythmias
- Polyuria
- Alkalosis
- Flat T wave ST depression, U wave
- Hyperkalemia
- Muscle cramps
- Irritability
- N/V, diarrhea
- Orthostatic hypotension
- Peaked T waves, prolonged PR and QRS interval, ST depression
- Digitalis toxicity

Magnesium

- Second most abundant intracellular cation (1.5-2.5)
- Extracellular < 1% of magnesium stores
- 60% in Bone
- Influences Ca level by effect on PTH
- Ca absorbed preferentially in gut
- Protein bound to albumin as is Calcium
- Functions in enzyme reactions, carbohydrate metabolism, protein synthesis, and ATP production
- Vasodilator
- Important in cardiac function 
- Involved in Na and K cross membrane transport
- Muscle contraction (if deficient then irritability)

Hypomagnesemia

- Common disorder 1/10 hospital pts.
- SX onset Mg < 1meq/L
- Assoc. w/ heart block, respiratory muscle paralysis and coma
- Commonly linked to hypocalcemia and hypokalemia

Hypomagnesemia

- DDX
- Malabsorption, steatorrhea (40% absorbed already)
- Surgery, IBD
- Excess Ca or PO₄ in gut
- Pancreatitis (saponification)
- DKA
- Hyperaldosteronism
- ↑ PTH
- Sepsis, burns, wounds
- Aminoglycosides, CTX, diuretics, insulin

Hypomagnesemia

- **SX&SX**
- **Mental status changes**
- **Nervous hyperirritability**
- **Weakness, fatigue**
- **Leg/foot cramps**
- **Hyperreflexia**
- **Positive chvosteks and trousseau signs**
- **Tachycardia, labile B.P.**
- **Pvc's, prolonged PR, QT and QRS int.**
- **T wave inversion, ST depression and U wave**
- **Digitalis toxicity**

Hypermagnesemia

- Uncommon
- Most common reason = Renal Failure with magnesium containing medications iatrogenic

Hypermagnesemia

- SX&SX
- Decreased neuromuscular function
- Decreased muscle nerve activity
- Decreased DTR's
- Weakness->paralysis
- N/V
- Bradycardia-> heart block-> cardiac arrest
- ↑ PR, ↑ QRS, ↑ T wave

Treatment

- Hypomagnesemia
- Treat underlying cause ABC's
- Supplement
- Magnesium gluconate, citrate, glycinate or taurate not oxide or sulfate
- Hypermagnesemia
- Treat underlying cause ABC's
- Diuresis
- Calcium gluconate