

Magnesium

Interpretive Summary

Description: Magnesium is primarily an intracellular cation that is important in many enzymatic reactions. Knowledge of magnesium levels is most beneficial in critically ill patients but can be of use in patients with gastrointestinal disease.

Decreased Magnesium

Common Causes

- Hypoproteinemia
- Gastrointestinal disease
 - Inadequate intake
 - Diseases leading to malabsorption
 - Malabsorptive diseases
 - Colitis
 - Short bowel syndrome
- Kidney disease leading to high urine output
 - Drug therapy
 - Aminoglycosides
 - Diuretics
 - Cisplatin
 - Carbenicillin/ticarcillin
 - Amphotericin B
 - Postobstructive diuresis
 - Renal tubular acidosis
- Shifts from the extracellular to the intracellular space
 - Therapy for diabetic ketoacidosis (DKA)
 - Insulin
 - Bicarbonate
- Primary hypoparathyroidism

Uncommon Causes

- Acute pancreatitis
- Acute myocardial infarction
- Hyperaldosteronism
- Blister beetle poisoning (horses)
- Lactation tetany (Shetland mares)
 - Excessive loss from lactation is also possible in dogs

Related Findings

- Kidney Disease
 - Increased BUN, creatinine and phosphorus
 - Isosthenuria
- Gastrointestinal Disease
 - Decreased cobalamin
 - Folate may be increased, decreased or normal
 - Decreased or normal albumin, globulin, cholesterol
- Electrolyte disturbances

- Decreased calcium
- Decreased potassium
- Hypoparathyroidism
 - Decreased calcium, increased phosphorus
 - Decreased ionized calcium with a concurrent decreased or low normal parathyroid hormone level (PTH)
 - Patients with primary hypoparathyroidism may be refractory to treatment if concurrent hypomagnesemia is not treated

Increased Magnesium

Common Causes

- Kidney disease with poor glomerular filtration
- Post renal obstruction
- Increased intake
 - Antacids
 - Laxatives
 - IV infusion of Mg+ containing fluids

Uncommon Causes

- Thoracic neoplasia and pleural effusion (cats)

Related Findings

- Kidney Disease
 - Increased BUN, creatinine and phosphorus with isosthenuria
- Post-renal obstruction
 - Increased BUN and creatinine
 - Increased potassium with severe cases
 - Decreased urine output
 - Urine sediment can show crystals, blood, white blood cells with obstructive disease
 - Uroabdomen
 - Abdominal fluid contains higher creatinine concentrations than serum
 - Contrast radiographs for urinary tract rupture and leakage
 - Abdominal ultrasound for masses, stones, other causes of obstruction in the urinary tract

Additional Information

Physiology

- Magnesium is present in both ionized and protein-bound forms. The ionized (Mg^{2+}) form is the biologically active form.
- 40-50% of the ion is intracellular.

References

- Ettinger SJ, Feldman EC. *Textbook of Veterinary Internal Medicine*, 7th ed. St. Louis, MO: Saunders Elsevier; 2010.
- Stockham SL, Scott MA. *Fundamentals of Veterinary Clinical Pathology*, 2nd ed. Ames, IA: Blackwell; 2008.
- Willard MD, Tvedten H, eds. *Small Animal Clinical Diagnosis by Laboratory Methods*, 5th ed. St. Louis, MO: Saunders; 2012.

Last updated 11/1/2013