**Potassium**

**Interpretive Summary**

**Description:** Potassium is an intracellular ion that is responsible for maintenance of fluid and electrolyte balance. Potassium is essential for muscle and nerve function.

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**Decreased Potassium**

**Common Causes**

- Chronic kidney disease (cats)
- Alimentary loss
  - Vomiting especially with obstruction
  - Diarrhea
  - Choke (horses)
- Renal loss
  - Diuretics
  - Post-obstructive or prolonged diuresis
- Decreased intake
  - Potassium-deficient fluid therapy
  - Potassium deficient diets
- Potassium translocation from extracellular to intracellular fluids
  - Insulin and glucose therapy
  - Bicarbonate infusion
  - Alkalemia

**Uncommon Causes**

- Renal tubular acidosis
- Hyperaldosteronism
- Cushing’s disease
- Hypokalemic myopathy of Burmese kittens

**Related Findings**

- Chronic kidney disease (cats)
  - Increased BUN, creatinine and phosphorus
  - Decreased urine specific gravity
- Alimentary loss
  - Evidence of gastrointestinal obstruction on abdominal radiographs or ultrasound
  - Often also have decreased chloride and increased TCO2
- Potassium translocation from extracellular to intracellular fluids
  - Increased TCO2

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**Increased Potassium**

**Common Causes**

- Acute renal failure (anuric or oliguric)
- Urinary obstruction/rupture
- Addison’s disease
- Pseudohyperkalemia (factitious) due to translocation of potassium from cells post-collection
  - Delayed serum separation
Asian dog breeds (Akita, Shiba Inu, Jindo, Chow Chow, and Shar Pei)

- English Springer Spaniels
- Leukocytosis (>100,000/µL)
- Thrombocytosis (>1,000,000/µL)
- Hemolysis

**Uncommon Causes**

- Selected gastrointestinal diseases
  - Whipworms
  - Salmonellosis
  - Perforated duodenal ulcer
- Medications
  - Angiotensin-converting enzyme (ACE) inhibitors
  - Trimethoprim
  - Prostaglandin inhibitors
  - Potassium sparing diuretics (spironolactone)
- Potassium translocation from intracellular fluid to extracellular fluid
  - Metabolic acidosis due to increased organic acids (ketones, lactate)
  - Massive tissue necrosis
    - Acute tumor lysis syndrome
    - Aortic thromboembolism
    - Rhabdomyolysis/muscle necrosis
      - Post-seizure
      - Strenuous exercise
  - Post-exercise in hypothyroid dogs (mild increase)
- Administration of potassium rich fluids
- Third space accumulation
  - Repeated drainage of fluid in chylothorax
- Sampling error
  - Collection from IV line where potassium administered
  - Contamination of serum with EDTA

**Related Findings**

- Acute Renal Failure
  - Increased BUN, creatinine and phosphorus
  - Isothemenuria (urine specific gravity 1.008-1.012) with decreased urine production
  - Positive PCR or serology for *Leptospira* spp., Lyme or other infectious agents
  - Urinary casts, pyuria, hematuria, proteinuria, glucosuria, and bacteriuria
  - Positive urine culture with pyelonephritis
- Urinary obstruction or rupture
  - Increased BUN and creatinine
  - Urine sediment can show crystals, blood, white blood cells with obstructive disease or blood with rupture
  - Uroabdomen
    - Abdominal fluid has 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
- Addison’s disease
  - Decreased sodium, chloride, and Na:K ratio
  - Albumin and cholesterol may be low normal
  - Lack of a stress leukogram (normal or increased lymphocytes and/or eosinophils)
  - Failure to stimulate on an ACTH stimulation test
Additional Information

Physiology

- Major intracellular cation
- Serum concentration does not accurately reflect total body concentration, but is nearly equivalent to the amount of potassium in the extracellular fluid compartment.
- Serum concentrations change with acidoses and alkaloses.
- Responsible for maintenance of intracellular volume and determining cellular membrane potential

References


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