Chloride

Interpretive Summary

Description: Chloride is the most abundant anion in the extracellular fluid. Chloride is important for acid/base balance, cellular fluid transport, and nerve function.

Decreased Chloride

Common Causes

- Gastrointestinal loss
  - Vomiting, diarrhea
  - Whipworms
  - Excess salivation
- Addison's disease
- Diabetes mellitus
  - Water shifts from intracellular to extracellular fluid to compensate for increased glucose
- Renal losses
  - Prolonged diuresis
  - Ketonuria
  - Diuretics, especially furosemide or thiazide

Uncommon Causes

- Metabolic acidoses with increased anion gap
  - Ketoacidosis
  - Lactic acidosis
  - Ethylene glycol
- Artifact
  - Lipemia,
  - Hyperproteinemia
- Congestive heart failure (edema)
- Hypoaldosteronism
- Respiratory acidosis, especially chronic
- Cutaneous loss due to sweating (horses)

Related Findings

- Gastrointestinal losses
  - Increased TCO2 often seen in cases of GI obstruction
  - Evidence of foreign body or other obstruction on radiographs or ultrasound
  - Positive fecal floatation with whipworms
- Addison's disease
  - Often have increased potassium, decreased sodium, and decreased Na/K ratio
  - Lack of a stress leukogram (normal or increased lymphocytes and/or eosinophils)
  - Failure to respond on an ACTH stimulation test
- Diabetes Mellitus
  - Increased serum glucose and glucosuria
  - Increased fructosamine
  - Ketonuria (in severe cases)

Increased Chloride

Common Causes

- Vomiting and Diarrhea
  - With loss of bicarbonate into intestine may develop hyperchloremic metabolic acidosis
  - With loss of water
    - Osmotic diarrhea or sequestration
    - Phosphate enemas
- Pure water loss without replacement
  - Insensible losses
    - Fever
    - Panting
    - Hyperventilation
    - Hyperthermia
  - Inadequate water intake
- Artifact due to bromide therapy

Uncommon Causes

- Diabetes insipidus
- Hypertonic saline fluid therapy
- Hyperaldosteronism
- Renal loss of water from osmotic diuresis
- Renal tubular acidosis
- Respiratory alkalosis (chronic)
- Salt poisoning
- Artifact due to sample dehydration from evaporation or sublimation

Related Findings

- Vomiting and Diarrhea
  - Decreased albumin and globulin in cases of protein losing enteropathy
  - Positive fecal ova and parasites, *Giardia* ELISA and/or fecal PCR testing
  - Evidence of gastrointestinal obstruction or thickened intestines on abdominal radiographs or ultrasound
- Phosphate enema
  - Increased phosphorus
- Pure water loss or inadequate water intake
  - Increased sodium, albumin, total protein, hematocrit

Additional Information

Physiology

- Chloride concentration is directly proportional to sodium concentration and inversely proportional to bicarbonate concentration.
- Serum chloride concentration is controlled by renal and gastrointestinal reabsorption and secretion.

Diagnostic Methodology

- Ion selective electrode assays are most common measurement technique.

References

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