

Sodium

Interpretive Summary

Description: Sodium is the most abundant cation in the extracellular fluid. It is partially responsible for the regulation of fluid volume within the blood stream. Sodium also is important for nerve and muscle function.

Decreased Sodium

Common Causes

- Gastrointestinal losses
 - Diarrhea
 - Vomiting
 - Excessive salivation
 - Whipworms
- Addison's disease
- Diabetes mellitus
 - Water shifts from intracellular to extracellular fluid to compensate for increased glucose
- Renal losses
 - Diuretics
 - Prolonged diuresis
 - Ketonuria

Uncommon Causes

- Fluid therapy with hypotonic or sodium-poor fluids
- Congestive heart failure (edema)
- Effusions
 - Peritonitis
 - Pancreatitis
 - Pleural effusion
 - Uroabdomen
- Artifact (pseudohyponatremia)
 - Hyperlipidemia
 - Hyperproteinemia
- Acute renal failure (anuric or oliguric)
- Severe liver failure with ascites
- Nephrotic syndrome with effusion/edema
- Hypoaldosteronism
- Syndrome of inappropriate antidiuretic hormone (ADH) secretion (SIADH)
- Psychogenic polydipsia
- Cutaneous losses through sweating (horses)

Related Findings

- Addison's disease
 - Often have increased potassium; decreased Na:K ratio
 - Lack of a stress leukogram (normal or increased lymphocytes and/or eosinophils)
 - Failure to stimulate on an ACTH stimulation test
- Diabetes Mellitus
 - Increased serum glucose and glucosuria
 - Increased fructosamine
 - Ketonuria (in severe cases)

Increased Sodium

Common Causes

- Gastrointestinal loss of water
 - Diarrhea
 - Vomiting
 - Phosphate enemas
- Pure water loss without replacement
 - Insensible losses
 - Fever
 - Panting
 - Hyperventilation
 - Hyperthermia
- Inadequate water intake
 - Water deprivation

Uncommon Causes

- Hypertonic fluid administration (sodium bicarbonate, hypertonic saline)
- Osmotic diuresis
 - Mannitol
 - Diabetes mellitus
- Renal failure
- Diabetes insipidus (central or nephrogenic)
- Hyperaldosteronism
- Adipsia/hypodipsia/defective thirst response
 - Syndrome in cats and miniature schnauzers
 - Seen in some neurological patients
- Toxic
 - Salt toxicity
 - Paintball toxicosis

Related Findings

- Gastrointestinal loss of water
 - 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 chloride, albumin, total protein, hematocrit

Additional Information

Physiology

- Serum sodium levels depend on regulation of blood volume and plasma osmolality
- Hyponatremia suggests hypoosmolality
- Hypernatremia suggests hyperosmolality

Diagnostic Methodology

- Ion-selective electrode is the most common measurement technique

References

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