

A Quick Reference on Chloride

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KEYWORDS

• Chloride • Reference • Analysis • Sodium bicarbonate

KEY POINTS

- Chloride is an essential element, playing important roles in digestion, muscular activity, regulation of body fluids, and acid-base balance.
- As the most abundant anion in extracellular fluid, chloride plays a major role in maintaining electroneutrality.
- Chloride is intrinsically linked to sodium in maintaining osmolality and fluid balance and has an inverse relationship with bicarbonate in maintaining acid-base balance.
- It is likely because of these close ties that chloride does not get the individual attention it deserves; we can use these facts to simplify and interpret changes in serum chloride concentrations.
- Chloride concentration is primarily regulated by the gastrointestinal tract and kidneys.

ANALYSIS

- Indications: It is not ordered on its own but included in electrolyte, blood gas, or metabolic or full biochemical panels; it often used in the evaluation of systemic diseases characterized by vomiting, diarrhea, dehydration, polyuria, and polydipsia or in patients likely to have metabolic acid-base abnormalities.
- The typical reference range is as follows: approximately 107 to 113 mEq/L for dogs and 117 to 123 mEq/L for cats. These values may vary slightly among laboratories.

The authors have nothing to disclose.

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- Chloride concentrations should be corrected to account for changes in plasma-free water. Corrected chloride can be estimated as follows:

$$[\text{Cl}^-]_{\text{corrected}} = [\text{Cl}^-]_{\text{measured}} \times 146^A / [\text{Na}^+]_{\text{measured}} \text{ (dogs)}$$

$$[\text{Cl}^-]_{\text{corrected}} = [\text{Cl}^-]_{\text{measured}} \times 156^A / [\text{Na}^+]_{\text{measured}} \text{ (cats)}$$

- Where $[\text{Cl}^-]_{\text{measured}}$ and $[\text{Na}^+]_{\text{measured}}$ are patients' serum chloride and sodium concentrations; ^Athe values 146 and 156 reflect the middle of the serum sodium reference intervals for dogs and cats, respectively, which may vary slightly among laboratories.
- The resultant $[\text{Cl}^-]_{\text{corrected}}$ is then compared with the reference interval given for serum chloride for interpretation (**Fig. 1**).
- The danger values are unknown. Muscle twitching or seizures in hypochloremic animals are probably attributable to metabolic alkalosis and decreased ionized calcium concentration, whereas clinical signs associated with hyperchloremia are probably attributable to hyperosmolality.
- Artifacts: Pseudohypochloremia results when chloride is measured in markedly lipemic or hyperproteinemic samples by means of techniques that are not ion selective, and sodium is similarly influenced; therefore, corrected chloride should not be affected. Halides (eg, bromide, iodide, fluoride) are measured as chloride, falsely increasing measurements even when ion-selective techniques are used. This false elevation is especially important to recognize in animals receiving potassium bromide as an anticonvulsant.
- Drug effects: Administration of chloride-containing solutions may increase chloride concentration, whereas loop diuretics and thiazides may cause excessive renal loss of chloride relative to sodium. Corticosteroid administration can result in mild hypochloremia.

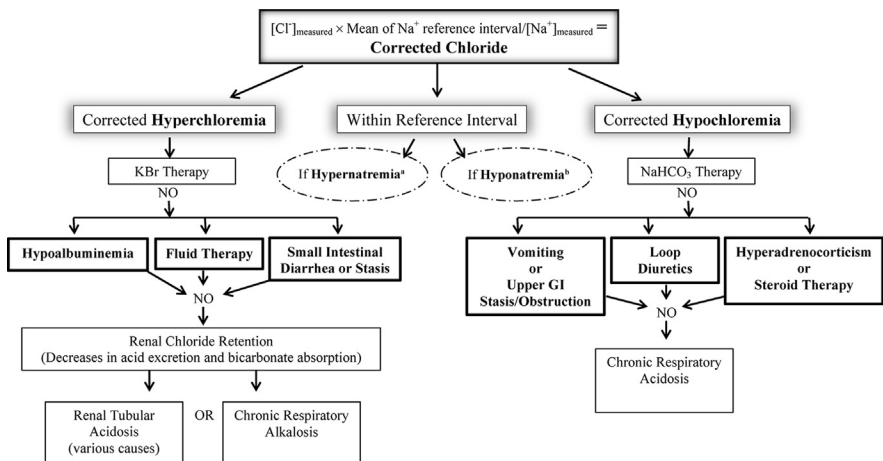


Fig. 1. Algorithm for evaluation of patients using corrected chloride. The heavily outlined boxes indicate the most common causes. ^a See Julien Guillaumin and Stephen DiBartola's article "A Quick Reference on Hypernatremia," and ^b Julien Guillaumin and Stephen DiBartola's article "A Quick Reference on Hyponatremia," in this issue. Cl, chloride; GI, gastrointestinal; KBr, potassium bromide; Na, sodium; NaHCO₃, sodium bicarbonate.

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