

2013 AAHA/AAFP Fluid Therapy Guidelines for Dogs and Cats

Supplemental Information

See the **2013 AAHA/AAFP Fluid Therapy Guidelines for Dogs and Cats*** for details about use of these fluid types at aahanet.org/Library/FluidTherapy.aspx

TYPES OF FLUIDS



Crystalloids

Crystalloids are composed of electrolytes and other solutes that can freely move between the intra- and extravascular fluid-containing spaces. Crystalloids may be further categorized based on tonicity. *Isotonic* fluids have the same number of effective osmoles as plasma. *Hypotonic* solutions contain fewer and *hypertonic* contain more than plasma. The terms *balanced* and *polyionic* refer to the presence of electrolytes and other solutes normally found in plasma. Sodium chloride (0.9%) is not balanced because it contains only two electrolytes, sodium and chloride.

Crystalloids may be used as *replacement* or as *maintenance* fluids. *Replacement* fluids are intended to replace lost body fluids. *Maintenance* fluids are provided to keep up with normal sensible and insensible fluid losses in hospitalized patients that are not eating or drinking normally.

Isotonic crystalloids (e.g., *balanced isotonic electrolyte solution*; *Lactated Ringer's Solution [LRS; Hartman's]*)

- Use when the patient's electrolyte levels are unknown at the start of therapy.
- Buffers in crystalloids include lactate, acetate or gluconate.
- Maintenance crystalloid solutions are commercially available. Alternatively, fluids made up of one part replacement solution and one part D5W plus potassium (KCl, 13–20 mEq/L) would be ideal for replacing normal ongoing losses because of its lower-sodium and higher-potassium concentration. Another option for a maintenance fluid solution is to use 0.45% NaCl + KCl (13–20 mEq/L).

- Isotonic polyionic replacement crystalloids such as LRS may cause electrolyte disturbances (e.g., hyponatremia) if used as maintenance fluids. However, as long as the kidneys are functioning and electrolytes are being monitored, replacement solutions such as LRS can be given for maintenance.

Isotonic 0.9% sodium chloride (normal saline, NaCl)

- Has higher concentrations of sodium and chloride than plasma.
- There is conflicting evidence about whether the use of sodium chloride alone may cause metabolic acidosis.¹ Use caution and monitor closely if using NaCl in acidemic patients.

Hypotonic crystalloids (e.g., *0.45% sodium chloride*)

- Can be used as maintenance solution if potassium is added (e.g., add 13–20 mEq/L).

Dextrose in water

- Most commonly as 5% dextrose in water ("D5W"). Used as a source of free water in hypernatremic patients, as a source of dextrose, to dilute drugs and as a component of maintenance fluids.
- Hypotonic to plasma and not used alone for maintenance or replacement.

Hypertonic crystalloids (e.g., *7.5% sodium chloride*)

- Can produce significant sodium and chloride overload.
- Do not use in dehydrated or hypernatremic patients.²

Colloids

Colloids contain large molecules that are restricted to and stay within the intravascular space longer than crystalloids.

Natural colloids include blood, plasma and albumin.

- Useful for replacement of actual losses in blood components.
- Potential for anaphylaxis, although its incidence is low.³

Synthetic colloids include starches, polysaccharide and gelatins.⁴

- Used for rapid and sustained volume expansion.
- Can cause coagulation deficits; may exacerbate renal disease.^{5–7}

- Easier to overload than crystalloids, especially in cats. Titrate to effect.
- Hydroxyethyl starch (HES) is a category that includes hetastarch and tetrastarch.⁸ Consult product inserts because dosing of the different types of HES may vary.^{9,10}

*Davis H, Jensen, T, Johnson, A, et al. 2013 AAHA/AAFP Fluid Therapy Guidelines for Dogs and Cats. *J Am Anim Hosp Assoc* 2012; 49:149–59.

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