Fluid Therapy in Small Animals

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Fluid therapy remains a cornerstone of small animal emergency and critical care, requiring a thorough understanding of body fluid compartments, pathophysiologic fluid shifts, and the physicochemical properties of available fluids. Total body water constitutes approximately 60% of body weight and is distributed between intracellular and extracellular compartments, with the latter subdivided into interstitial and intravascular spaces. Maintenance of osmotic equilibrium across these compartments is essential for cellular function and systemic homeostasis.

Assessment of hydration status relies on a combination of anamnestic, physical, and laboratory parameters. Differentiation between interstitial, intravascular, and intracellular fluid deficits is critical, as each compartment presents distinct clinical and pathophysiological features. Intravascular volume loss primarily affects perfusion parameters, whereas interstitial dehydration manifests as changes in skin turgor and mucous membranes. Intracellular dehydration, driven by alterations in extracellular osmolality, is not directly detectable on physical examination but has significant neurological implications.

Fluid losses are broadly categorized as isotonic, hypotonic, and rarely, hypertonic losses. Isotonic losses, commonly associated with gastrointestinal or renal disease, primarily affect the extracellular compartment without major electrolyte shifts. In contrast, hypotonic losses lead to increased extracellular osmolality and subsequent intracellular dehydration, with potential central nervous system consequences.

Crystalloids represent the most commonly used fluid type and are classified according to tonicity. Isotonic balanced crystalloids, such as lactated Ringer's or Plasma-Lyte, are preferred for most clinical scenarios due to their buffering capacity and reduced risk of acid–base disturbances. Unbalanced solutions, such as 0.9% saline, may be indicated in specific conditions but carry risks of hyperchloremia and metabolic acidosis. Hypotonic fluids are indicated for free water deficits but must not be used for rapid intravascular resuscitation. Hypertonic saline provides rapid but transient plasma volume expansion and is reserved for specific indications such as hypovolemic shock or increased intracranial pressure.

Colloids, including synthetic starches and blood products, exert oncotic effects that retain fluid within the intravascular space. However, the use of synthetic colloids has declined due to associations with acute kidney injury, coagulopathy, and other adverse effects.

Effective fluid therapy requires an individualized, goal-directed approach based on patient status, underlying disease, and ongoing losses. Careful monitoring is essential to avoid complications such as volume overload, electrolyte imbalances, and acid–base disturbances. Advances in critical care continue to refine fluid selection and administration strategies, emphasizing patient safety and outcome optimization.