

FLSC Rodent Dehydration Guidelines

General Principles

The guidelines included in this document provide the specifics of maintaining fluid homeostasis during post-operative care, experimental drug administration, or when rodents are anorexic and dehydrated for whatever reason. Specific information regarding recommended administration routes and fluid volumes can be found in the document, “University of Notre Dame Institutional Animal Care and Use Committee Fluid Administration Guidelines.”

Guidelines for Maintenance of Fluid Homeostasis

Evaluation

Evaluate fluid homeostasis by lifting gently the skin on the animal’s back. If skin turgor is reduced and tents, i.e. it does not snap right back, if the oral mucosa is dry, then the animal is severely dehydrated. Dehydration does not become evident by loss of skin turgor until the animal is at least 5% dehydrated. Since a mild degree of dehydration is not easily detectable clinically, it is prudent to hydrate the animal when in doubt. Fluids should be replaced with a warmed physiological solution.

Fluid Replacement Solutions*

Lactated Ringers Solution (LRS) is a standard and recommended fluid replacement solution. It is comprised of a physiological saline solution with added electrolytes that mimic the components of the body’s extracellular fluids.

Sterile Saline (0.9% NaCl) is a readily available solution for rehydration. This solution lacks electrolytes to replace any deficits that can occur with severe dehydration.

Dextrose 5 % in water (D5W) can also be used SC in a mildly dehydrated animal and post-operatively. D5W is also a good partial fluid replacement for an anorexic animal. Supply half of the total calculated fluid volume as D5W and half of the volume as LRS mixed in the same syringe when treating an anorexic animal.

Dehydrated animals must be treated immediately by supplying a measured volume of water for drinking. In addition, if the animal is recumbent or more than 5% dehydrated, subcutaneous fluids should be administered. Supplemental oral fluids or parenteral hydration must be administered whenever any of the following clinical signs are observed:

1. Dehydration of > 5% defined as “clinical dehydration”. This is evaluated as loss of skin turgor (tenting of skin) in rodents.
2. No urine output for > 12 hours. Bedding is dry in rodent cages. There are few or no feces. Feces are dry.
3. Urine specific gravity is increased above normal. It may be possible to get a drop of urine on a dip stick by picking up the rodent and holding it over a Petri dish or a urine dip stick. Alternatively, in order to evaluate urine specific gravity, it may be necessary to house the rodent in a metabolic cage and collect urine.
4. Lack of appetite and body weight loss of more than 10% (2.5 g in a 25 g mouse or 25 g in a 250 g rat) over <48 hours. Dehydrated animals will not eat and will limit their food intake thus dehydration will also cause weight loss. A 5% dehydrated animal will have lost 5% or more of its body weight.
5. The eyes appear sunken and dry.
6. The animal is listless and inactive.
7. An animal that has been fluid restricted for some time must be given supplemental water in carefully graded portions, in order to prevent over-hydration with subsequent detrimental physiologic consequences.

Calculation

The formula to determine volume of fluid to be replaced is:

Body weight (grams) X % dehydration (as a decimal value) = Fluid volume (ml)

Thus a 300 gram rat estimated to be 10% dehydrated would need to have $300 \text{ g} \times 0.10 = 30 \text{ ml}$ of fluids replaced.

Subcutaneous Administration (SC)

Replace 50% of the calculated volume immediately by the administration of fluid subcutaneously (SC), preferably warmed up to 100.0° F. Administer the remaining fluid volume with warmed fluid SC after 2-3 hours.

Intraperitoneal Administration (IP)

Fluids can also be replaced by intraperitoneal (IP) administration provided there is no respiratory distress present. It is exceedingly important to warm fluids to normal body temperature when IP administration is done. The volume of fluid administered IP at one time should not exceed 50% of the **total blood volume** of the animal. Total blood volume is estimated as 6 % of the total body weight. The calculation for IP fluids is:

[Blood volume $0.06 \times$ body weight (grams)] X 0.50 = fluid replacement volume in ml

e.g. a 300 g rat: $0.06 \times 300 \text{ g} = 18 \text{ ml} \times 0.50 = 9 \text{ ml}$ fluid

Calculation of 24 hour maintenance fluid requirements

If an animal is not drinking on its own, the daily maintenance requirement of fluids will have to be replaced in order to prevent dehydration. This requirement is estimated as 100 ml/kg in a 1 kg or smaller animal.

Thus a 300 gram rat would require $100 \text{ ml} \times 0.3 \text{ kg} = 30 \text{ ml}/24 \text{ hours}$

Twenty-four hour fluid volume replacements should be divided into 2 or 3 treatments over the 24 hour period.

Frequently both replacement fluids and maintenance fluids will have to be administered.

Signs to Watch for During Fluid Replacement Therapy

Urination – Make sure the animal is urinating. If renal failure is present, due to disease, severe dehydration, or drug effect, the animal will not be able to compensate for over-hydration.

Respiratory Distress – Over-hydration may cause pulmonary edema and respiratory distress. This can be seen as rapid and labored breathing.

If adverse signs are noted, contact the FLSC veterinary staff (1-6085).

* All fluids for parenteral use must be sterile. Replacement fluids are readily commercially available. See FLSC for ordering information.

Bibliography

Simplified Fluid Therapy. Kirk R.W. and Bistner S.K. In: **Veterinary Procedures and Emergency**. 4th ed. pp. 591-623. 1985. Philadelphia: WB Saunders Co.

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The permission for revision and use of the original guidelines prepared by the Division of Comparative Medicine, Massachusetts Institute of Technology, Cambridge, MA, is gratefully acknowledged.

