

FLSC Rodent Dehydration and Treatment Policy

Purpose

This document provides the specifics of maintaining fluid homeostasis. Fluids may be indicated during post-operative care, experimental drug administration, or when rodents are anorexic and dehydrated. Specific recommended administration routes and fluid volumes are available in the IACUC Fluid Administration Guidelines document available online.

Evaluation of Dehydration

1. 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.
2. 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.
3. No urine output for > 12 hours. Bedding is dry in rodent cages.
4. Increased urine specific gravity 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.
5. No fecal output. There are few or no fecal pellets.
6. 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.
7. The eyes appear sunken and dry.
8. The animal is listless and inactive.

Treatment

1. Dehydrated animals must be treated immediately by supplying a measured volume of water for drinking.
2. Subcutaneous fluids should be administered if the animal is recumbent or more than 5% dehydrated.
3. Fluids should be replaced with a warmed physiological solution.
4. Supplemental oral fluids or parenteral hydration must be administered whenever clinical signs are observed.
5. 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.
6. Calculate the fluid replacement volume for a fluid deficit using the following formula:
$$\text{Body weight (grams)} \times \% \text{ Dehydration (as a decimal value)} = \text{Fluid volume (ml)}$$
7. Calculate 24 hour maintenance fluid requirements for those animals not drinking on their own. 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.
$$\text{Body weight (kg)} \times 100 \text{ ml} = \text{Fluid volume (ml) per 24 hour}$$
8. Twenty-four hour fluid volume replacements should be divided into 2 or 3 treatments over the 24 hour period. Frequently both replacement and maintenance fluids will have to be administered.

Fluid Replacement Solution Options

1. 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.
2. 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.
3. Dextrose 5 % in Saline (D5S) can also be used SC in a mildly dehydrated animal and post-operatively. D5S is also a good partial fluid replacement for an anorexic animal. Supply half of the total calculated fluid volume as D5S and half of the volume as LRS mixed in the same syringe when treating an anorexic animal.

Fluid Administration Routes

Subcutaneous Administration (SC)

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

Intraperitoneal Administration (IP)

1. Fluids can also be replaced by intraperitoneal (IP) administration provided there is no respiratory distress present.
2. It is imperative to warm fluids to normal body temperature when IP administration is done.
3. 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 x Body weight (grams)] x 0.50 = Fluid volume (ml)

Precautions

1. All fluids for parenteral use must be sterile. Replacement fluids are readily commercially available.
2. 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.
3. Over-hydration may cause pulmonary edema and respiratory distress. This can be seen as rapid and labored breathing.
4. If adverse signs are noted, contact the FLSC veterinary staff (1-6085).

References

1. 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.
2. General Guidelines for Fluid Therapy. Senior DH. In: **Textbook of Veterinary Internal Medicine**. Ettinger SJ, ed. 3rd ed. pp. 431-435. 1989. Philadelphia: WB Saunders Co.
3. 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.