

CHAPTER ELEVEN DIAGNOSIS AND TREATMENT OF ILLNESS

DEHYDRATION AND FLUID REPLACEMENT THERAPY

The average daily water budget for a bat is determined by what they take in (food and water), and what is lost in feces and urine, as well as evaporative loss that occurs during flight and normal activities. The average daily water budget is 24.5% and 15.8% of the body weight for a big brown bat (*E. fuscus*), and Brazilian free-tailed bat (*T. brasiliensis*) respectively. Without sufficient intake, a 10 to 20g bat can have a daily water loss of as much as 1 to 3mls.

Bats that have been confined in areas without food or water, or are too weak to fly due to injury or illness will become dehydrated. Bats in captivity can become dehydrated if the humidity is too low or they don't have access to fresh water at all times. Orphaned bats are always dehydrated to some degree.



Figure 11-1. Glossy wings on a well-hydrated bat. *E. fuscus*. Bat World facility. Photo by A. Lollar.

When the skin of a normally hydrated animal is gently pinched (tenting) the skin takes less than one second to return. Well hydrated bats will have smooth and slippery mucous membranes and the wing membrane will appear glossy (Figure 11-1). A bat that is slightly dehydrated (around 5%) will have slightly dry mucous membranes and may have stringy saliva. Other signs include loss of appetite, vomiting, and feces stuck to the tail membrane. The skin of a bat that is over 5% dehydrated will take longer than one second to return to normal after being tented, and the mucous membranes will appear dry and tacky. A bat that is around 8% dehydrated will have a flattened or sunken abdomen with wrinkled skin, and the wing membrane may appear somewhat dull. The eyes of a severely dehydrated bat (over 10%) will actually sink back in the sockets (and the bat may be unable to open its eyes). The skin will remain in place when pinched. Inability to coordinate muscular movements may be observed, or the bat may be comatose. Bats over 10% dehydrated may not survive.

Bats are unlikely to be sufficiently rehydrated with oral fluids alone and therefore must be given warmed subcutaneous (SQ) injections of electrolytes (e.g., Lactated Ringers solution, Normasol or Plasmalyte), regardless of whether or not they accept fluids orally. Depending on the severity of dehydration, electrolytes administered SQ are usually absorbed within 5-30 minutes (see Injection Technique on the following page). Severely dehydrated bats that do not absorb fluids may be suffering from irreparable organ failure.

After an initial injection, the skin of a bat quickly resumes its former elasticity. Most adult bats will also be sufficiently hydrated after only 1 or 2 injections over a 24 hour period. Once hydrated, infant bats can be fed (see Feeding and Care of Infant Bats) and adult bats can be offered small amounts of soft food (see Feeding Adult Bats). The Bat World Sanctuary soft food diet is easy to swallow, provides complete nutrition, and contains additional fluids which will assist in the rehydration process. Note: Signs of over-hydration include shivering and edema around the face, head, neck and wrists. Over-hydrated bats should be kept warm until excess fluids have been absorbed.

**TABLE 11-1
FLUID REPLACEMENT SCHEDULE**

Weight (g)	Dose (ml)	Frequency (hours)
Pups:		
Less than 1.0	0.25 to 0.50	1 injection every 24 hours
1.0 to 5.0	0.50 to 1.5	1 to 2 injections within 24 hours
Juveniles or Adults:		
3.0 to 5.0	1.0 to 1.5	1 to 2 injections within 24 hours
5.1 to 15.0	1.0 to 3.0	1 to 2 injections within 24 hours
15.1 to 20.0	2.0 to 3.0	1 to 2 injections within 24 hours
20.1 to 65.0	5.0 to 15.0	1 to 2 injections within 24 hours

CHAPTER TEN ROUTINE THERAPIES

INJECTION TECHNIQUES

Common locations for administering medications by injection include intramuscular (IM), intravenous (IV), and subcutaneous (SQ). The small size of most insectivorous bats makes intravenous and even intramuscular administration of medications difficult and even dangerous. Most parenterally administered medications are therefore given to bats subcutaneously. Despite the fact that some medications are intended to be administered only intramuscularly or intravenously in other animals, subcutaneous administration of the medications recommended in this manual has proven to be of value in bats as described in the treatment sections.

Pre-packaged, sterile, disposable 1.0ml or 0.5ml syringes with 25 to 27-gauge, 1/2" needles are recommended. The use of syringes with removable needles allows medications to be mixed or diluted in a single syringe. Withdraw solutions slowly until the syringe has filled to the desired level. Withdraw the needle and hold the syringe with the needle pointing upward, and then tap the side of the plastic syringe with the forefinger so that any air bubbles move to the top. Push the plunger in slightly until all air inside the syringe has been expelled.

The author recommends using one of two techniques. 1) Place the bat on a flat surface. Keep the animal's head and upper body gently secured within a soft cloth or roosting pouch, leaving the body exposed from the lower shoulder area on down. To administer the injection, choose a site near the lower shoulder or back and to one side of the midline. Insert the needle with the bevel up, horizontally just beneath the skin, keeping the needle parallel to the bat's body at all times. Check the location of the needle beneath the skin by lifting it slightly once it has been inserted. If the needle has been inserted beneath the skin correctly, the skin will rise with the needle when it is slightly lifted (Figure 10-1A). Do not insert the needle down into the body. If the needle punctures any part of the bat's body wall it will likely cause severe damage which may result in seizures and death. 2) Hold the bat in the palm of one hand with its head facing the heel of the hand. Using the ring and little finger, apply gentle pressure to hold the bat's head and shoulders in place. Insert the needle with the bevel up, horizontally just beneath the skin, keeping the needle parallel to the bat's body at all times. Check the location of the needle beneath the skin by lifting it slightly, as shown in the top right photo. If the needle has been inserted beneath the skin correctly, the skin will rise with the needle when it has been slightly lifted (Figure 10-1B). The author recommends against using the fingertips to lift the bat's skin for injections. The small size of bats and their propensity to wiggle increases the possibility of accidentally injecting the fingers.

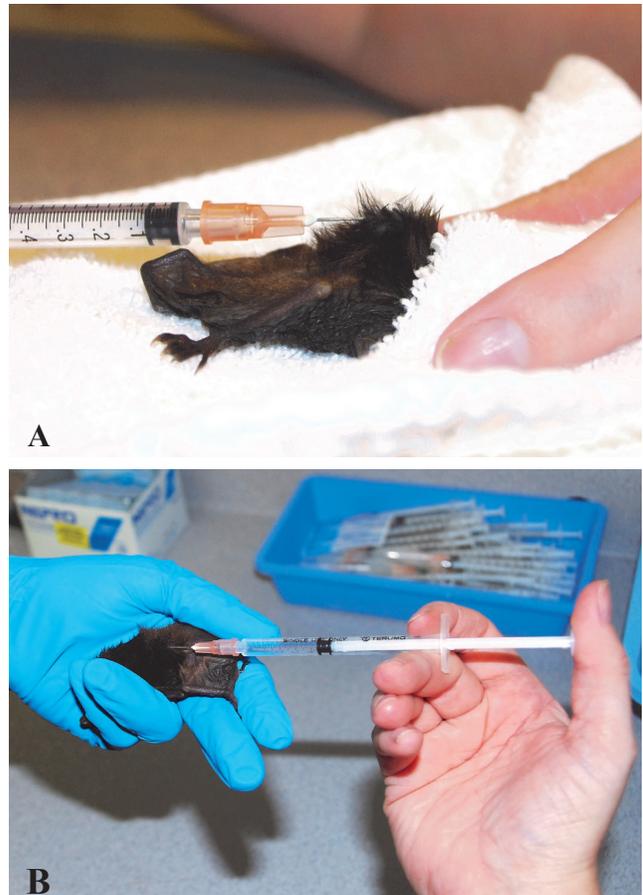


Figure 10-1. A and B: Two injection techniques preferred by the author. *E. fuscus*. Bat World facility. Photo by A. Lollar.

Properly administered, the skin surrounding the injection site will form a small bubble where the medication is injected. This bubble quickly disappears as the fluid is absorbed into the bat's body. Do not recap or reuse needles. Recapping increases the likelihood of needle sticks, and needles are intended for one time use only. Used needles and syringes should be discarded in biohazard waste containers (Sharps containers).