

FLUID THERAPY

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Introduction-*the purpose of this handout is to explain the basic principles of fluid therapy and how they apply to wildlife patients.*

Consider Total Body Water

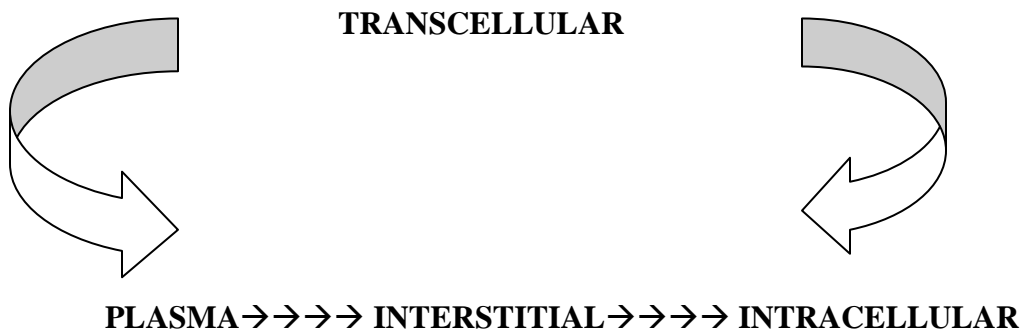
- 60% in adult animals
- 75% in neonates
- 35% in obese animals

Taxonomy makes a difference!

- Chicken-57% body wt is H₂O
- Young birds-72% body wt is H₂O

Total body water divided into: Extracellular fluid compartment (50%)
Intracellular fluid compartment (50%)

Extracellular compartment subdivided into: -plasma volume
-interstitial fluid volume
-transcellular volume



(All compartments in a state of equilibrium)

Major forces responsible for water movement between compartments

- hydrostatic force (heart)
- osmotic force (proteins)
- composition of the fluid (electrolyte, glucose)

Alterations of Hydration Status

- Fluid deficit----dehydration, blood loss...
- Fluid excess----heart, renal, hepatic dz.

Causes of Fluid Deficit/Causes for Fluid Therapy

- Shock
- Dehydration (many, many causes)
- Blood loss

1. Shock -(a state of acute, severe circulatory failure) "*Inadequate circulation is the most common physiologic abnormality in most forms of shock.*"

Shock caused by -blood loss

- dehydration
- pain
- sepsis
- cardiac problems
- hypothermia
- anaphylaxis
- toxicity
- embolic



poor perfusion of blood to tissues

Shock---->hypothalamus---->sympathetic nervous system----> adrenal gland & pituitary gland----> catecholamines & other stress hormones

RESULT: -mobilize energy reserves
-support blood pressure
-conserve salt and water

Blood flow

- needed to bring -O₂, nutrients to tissues AND pick up CO₂ and metabolic byproducts.

Goal in Treatment of Shock with Fluids---> Increase fluid flow
Stabilize blood pressure
Increase O2 delivery and CO2 shuttling
Improve cardiac performance

Shock doses-mammals-60-90 ml/kg/hr
-birds- 90-100 ml/kg or (0.5-1.5 X blood vol (10% body wt))

2. Dehydration

Assessment of Hydration

- Body weight. (Acute weight loss, 1 kg. = 1L)
- Skin turgor
- Mucous Membranes
- Eye position
- Laboratory tests (PCV, TP, BUN, urine SG, electrolytes)
- Central venous pressure

Clinical Classification of Dehydration

- 1-4%-undetectable
- 5-7%-mild dehydration
- 7-9%-moderate dehydration
- 9-12%-severe dehydration

3. Blood Loss

- Cannot replace blood cells unless administering whole blood.
- Hemodilution
- Improve circulation

Fluid Therapy Requirements

- Deficit
- Maintenance
- Ongoing losses**

DEFICIT

$\% \text{ dehydration} \times \text{body weight (kg.)} = \text{L needed to replace deficit}$
(deficit, in most cases, should not be replaced faster than in a 24 hr period)

MAINTENANCE (dependent on metabolism)

TOTAL AMT OF FLUIDS THIS BIRD NEEDS/24 HR=

*10 ml
+ 6 ml
+ 0.3 ml

16.3 ml*

NOW DIVIDE THAT TOTAL INTO THE NUMBER OF TIMES YOU WILL HANDLE THIS BIRD TO ADMINISTER FLUIDS AND THE NUMBER OF TIMES IT IS APPROPRIATE FOR IT TO RECEIVE THE TOTAL DEFICIT OVER A 24 HR PERIOD.....

Other Reasons for Fluid Therapy

- diuresis
- toxicity
- hypothermia etc..

Types of Fluid Used in Fluid Therapy

- Isotonic
- Hypertonic

Most common **Isotonic**-0.9% NaCl

- Lactated Ringer's
- Normosol-R or -M

Routes of Administration

1. Oral adv.-inexpensive, relatively easy, can give large amounts.
disadv. -takes a while to get absorbed possibility of regurgitation and aspiration. NEVER give oral fluids to an animal that is displaying central neurologic signs, or is mentally obtunded.

2. Subcutaneous adv.-easy, inexpensive, can administer large amounts, hard to overload, min. handling.
disadv.-takes long to absorb, can cause hypothermia, can be painful, if not absorbed well, can form a sterile abscess.

- 3 Intravenous adv.-best for acute shock, extreme dehydration.
disadv.-more equipment, more expertise, more restraint at beginning, poss. of infection.

4. Intraosseous adv.-best if cannot get intravenous route, very small animals, relatively easy.
disadv.-more equipment, some expertise, may require anesthesia.

5. Intraperitoneum adv.-absorbtion is relatively fast, can use to warm up animal, inexpensive, relatively easy.
disadv. -may puncture an organ inadvertently.

Species-Specific Fluid Needs

-High metabolic rate= higher fluid requirement
(0.75-1.5 ml of H₂O needed per kilocalorie of basal energy required)

250 kg Bear-----> 4.5 L H₂O/Day (0.02%)
500 g turtle-----> 6 ml of H₂O/Day (1%)
150 g owl-----> 20 ml of H₂O/Day (13%)
30 g mouse-----> 6 ml of H₂O/Day (20%)

Monitoring Fluid Therapy

- Weigh animal daily
- Repeat physical exam daily
- Consider **new** ongoing losses
- Repeat laboratory data

Complications

- Inadequate fluid therapy**
- Fluid overload
- Complications associated with site of administration
- Stress from handling