



Rounds Notes is a monthly report from Sea Rogers Williams VMD, the views expressed are not necessarily that of the National Marine Life Center. Information in Rounds Notes should be considered confidential and used solely to benefit the health of aquatic animals everywhere.

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Rounds Notes 1-4: 1-4 (2009)

Headlines News: Hypoglycemia

Obviously Caveman is still very sick, and I have instituted a daily monitoring of blood glucose to determine if we can let him swim overnight. We have watched his blood sugar fluctuate as we monitor it with a hand held human glucometer, the iStat, and also a major reference laboratory (Idexx). In companion animal medicine, hypoglycemia (low blood sugar) is characterized by a value less than 70 mg/dl, with values of 60 mg/dl being serious, and values below 40 mg/dl* are critical. Causes of hypoglycemia in companion animals include a host of disorders including: sepsis, liver failure, insulin overdose or insulin producing tumor, starvation and malnutrition, neoplasia, parasitism, renal disease (renal glucosuria and Fanconi's), and some toxic and endocrine diseases.



In Kemp's Ridley sea turtles the cut off values are a little more difficult to interpret. Mean values vary and include 123 (Innis et al, 2007), 116 (Innis et al, 2008), 119 (Whitaker and Krum, 1999), and 82 (internal NMLC values), and a range created by looking at a single standard deviation would cover 57 to 146, but this range is not a 'normal' range, and clinical correlations are necessary to provide accurate interpretation of any one result. Companion animal normal ranges are established with thousand and thousands of data points and hundreds of clinical experiences with each value. Add this to an unknown accuracy range of equipment that is not validated for sea turtles and at least ± 10 units of typical variation.



How does this relate to Caveman? Clinical cases push the science of medicine into the art of practice and we need to draw a line in sand somewhere. My goal is to rehabilitate Caveman for wild release and at some point this will require getting him unhindered access to water, where he must not only be eating on his own, but able to hunt prey and avoid predators.

I have an arbitrary rule: If Caveman's blood sugar is greater than 80, he can swim overnight (if any staff member thinks he looks bad, it is ok to pull him and call me).

Why is Caveman demonstrating persistent blood sugar values below the mean? We have documented sepsis, renal disease, malnutrition, and likely liver disease (although this is thru inference of elevated tissue enzymes that are not proven to originate in the liver). Any and all of these metabolic conditions are likely combined to result in the pattern we are seeing. We continue to provide reptile ringer's solution, which helps with fluid support, provides a low level diuresis for the kidneys and some glucose. Intermittent IV dextrose when values are below 50 is administered, and tube feedings are done daily to reverse the negative nitrogen balance. Antibiotics should have the bacteremia under control, and the outcome may very well come down to the level of injury to the vital organs such as the liver and kidney that caveman sustained in a severe cold stun event. These organs are notoriously difficult to assess even in mammal were we have reasonably good lab tests. A diagnosis often comes down to a biopsy. A biopsy in Caveman's case would be ill advised as dangerous, and it is unlikely that the descriptive diagnosis we would achieve would help with the clinical management of this challenging case.

Clinical Update:

Caveman is holding his own, and while some problems are improved, such as the positive buoyancy, others such as the low blood sugar and anorexia persist. With daily tube feeding of the gruel, and fluids we have even seen some modest weight gain. Tissue enzymes are still off the charts in some cases but blood gas analysis is reasonable. We submitted another blood culture to see if we have resolved the bacteremia. While some BIPS have passed, others are still in the GI, although there was some feces in the pool this morning. A fecal was negative for parasites, cells, or blood but two species of commensal protozoa were observed in the poop. We'll continue with weekly radiographs until the BIPS pass. Some trapped colomic gas is still present.



Changes and notes for this week:

Switch the ampicillin from IM to SQ, also note the volume change due to the weight gain.

Add 12/ super B vitamin and 1/4 calcium 500mg tab along with the 1/2 Potass-a-chew oral potassium supplement to each gruel feeding.

A day in the life, Caveman:

We should try for two feedings a day, so start with Caveman first, and if not swimming move to his tank and offer herring or squid by tongs and leave a known number of pieces at the bottom at the end of a session, check 1 hour later and record / remove uneaten food. Repeat the feeding in the afternoon. Once the uneaten food is recorded and removed, if Caveman has not eaten, then pull for a tube feeding and fluids, and daily pm blood sugar check. Feeding is the 30 ml of gruel with supplements, and use the accu-check for a blood sugar.

For this week, continue with the rule, if the pm blood glucose is > 80 mg/dl or if eating then it is ok to swim overnight, this is not mandatory and if you think Caveman does not look right, pull and place in incubator and call me.

Esophageal Tube Feeding : Caveman **Fresh gruel is prepared daily**

CAVEMAN FISH GRUEL RECIPE: (-Kathy Z)

1 - 2 inches of medium sized herring – about 35-40 grams.

50 ml water

FINELY SHAVE very very very thin shavings/slices of herring, removing all fins, large bones and sharp pieces.

The knife with the blue handle works very well for this, and be sure the fish is frozen as it is easier to work with.

Don't worry, it'll be room temp by the time you're done.

CHOP the pile of shavings.

POUR WATER into the **BLENDER**. Pouring the water in first will help the fish bits not to stick (as much).

POUR FISH BITS into the blender.

BLEND BLEND BLEND. Pushing the “drink” button and letting it run through the cycle 2 or 3 times works very well. It should be thoroughly liquefied by the time you're done.

Makes about 75 – 80 grams.

If ordered by the veterinarian: Mix in ground potassium tablets and/or other vitamins/meds.

You need a cup to carry the gruel, a large feeding syringe, the marked red rubber catheter, and a bite block (PCV, hard plastic, and metal are all available) to the treatment area.

All materials should be handled like food prep items, and rinsed in water or shaken to be sure no detergents or chlorohexiderm is left in the tube or syringe.

- Fill the syringe with gruel (thru the tube or by the syringe tip)
- Tip the turtle up at 45° angle, open the mouth and inspect the oral cavity
Should be all clear, no fluid, obstructions etc.
- Have an assistant insert a bite block to keep the mouth open.
- With or without the water soluble lubricant pass the tube over the glottis and into the esophagus to the tape mark.
- Visually inspect the glottis to be sure the tube is NOT in the trachea
- Once you are visually sure the glottis is clear, the moth can be relaxed or allowed to close a little so it is not uncomfortable but the turtle can not bite the tube!
- Slowly administer the gruel, holding on the connection of the syringe and the tube (so they don't come apart spraying gruel everywhere), having the assistant monitor the back of the mouth for reflux, regurgitation, or overflow.
- If food starts to come back up, tilt the turtle head down until all the food flows from the mouth. Note results and try again the following day.
- If there are no problems with administration of the gruel, continue to hold the turtle up at a 45-90° angle for 5-10 min.
- Then allow the turtle to swim for 1 hour. (What about that rule, no swimming for 1 hour after eating, well, yea, what about it? it's for kids and peanut-butter sandwiches which combine to form an explosive in water, it does not apply to sea turtles.)
- Clean the materials used and return items to food prep for the next day.

Sea Turtles

Fletch,

We'll if ET can phone home, Fletch had to endure a Foam Home. For unknown reasons TRT-1's clarity was disrupted with particles and foam, just when the system was looking so good. Other water quality parameters such as coliforms and chlorine were within acceptable limits. The protein skimmer outflow was tweaked and a 50% water change was preformed, so Fletch was held out for a few hours after his physical exam, while we worked on the tank. A bag filter system will also be added to the tank. Fletch continues to do very well. Recent blood work still had elevated tissue enzymes (AlkP, AST, CK, LDH) and a rise in uric acid (0.7 mg/dl) will be monitored. Given the increase in select enzymes it will be a few months before transport and release options become viable. Fletch's appetite is good and there is an acceptable weight gain. We may want to boost the calcium in the diet as the Ca:P is still inverse (0.8).



Terrapins

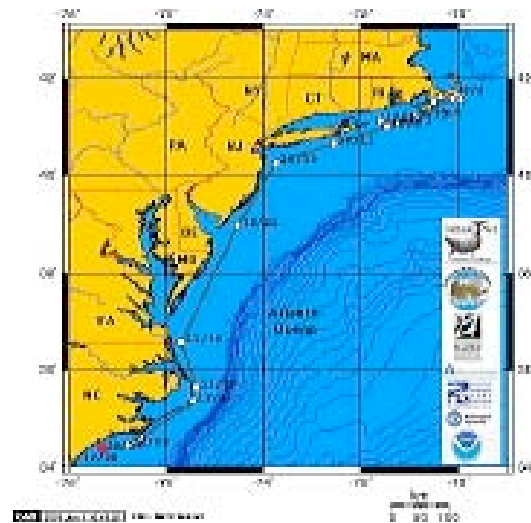
Growing and doing well, discussions revolve around marking them as individuals if group housing is considered, and if and when to give them a larger tank.

Cooters

Growing and doing well, very well in fact, we just need to keep up with the mess. The current water change schedule is 20% daily, with 50% on Mondays and Fridays and the occasional Sun. Messy little turtles.

Sea Turtles at Large

Lavender is reporting more regularly now, and while she had a different stranding history and even different stranding seasons than Ursula, who was given critical care at the New England Aquarium and rehabilitation at UNE's MARC (Lavender Nov 2006, Ursula Nov 2007) they were released on the same day, and appeared to have met back up at a possible Kemp's wintering hot spot. I am not surprised to find that these turtles are not going all the way to Florida, and yes, I know that all breeding of Kemp's is restricted to



the Gulf of Mexico.

I'm not bothered in the least they have found a winter haven north of the sunshine state. I think as we learn more about those Kemp's that leave the Gulf, and their migratory habits, we will learn a lot about the species. Remember, some of the earliest reports have the greatest concentrations of Kemp's found around Martha's Vineyard, this was long before we learned about arribadas and Rancho Neuveo. For now I wish both Ursula and Lavender a Happy New Year, and a safe and prosperous 2009, and may their Duracell batteries continue for another seven months so we can see if the head to Gulf of Maine and Cape Cod Bay once again.

* all values for glucose in mg/dl (converted from SI when needed)

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References:

1. Innis, C.J., et al., *Metabolic and respiratory status of cold-stunned Kemp's ridley sea turtles (Lepidochelys kempii)*. J Comp Physiol [B], 2007. 177(6): p. 623-30.
2. Innis et al, *Hematologic and plasma biochemical findings in cold-stunned Kemp's ridley sea turtles (Lepidochelys kempii)*, 2008 [in press]
3. Whitaker, B.R. and H. Krum, *Medical Management of Sea Turtles in Aquaria*, in *Zoo & Wild Animal Medicine*, M.E. Fowler and R.E. Miller, Editors. 1999, W. B. Saunders Company: Philadelphia. p. 217-231.

