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FELINE CHRONIC RENAL FAILURE –
WHY DO URINALYSIS?

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INTRODUCTION
Why do urinalysis? How can we not? A quick and inexpensive urinalysis including a urine specific gravity with a refractometer, a urine dipstick, and a microscopic examination of the urine sediment provides more accurate information than any other test of the urinary system. Adding a urine culture and more accurate assessments of proteinuria when indicated and a world of information invaluable for therapy and prognostics is unveiled.

URINE SPECIFIC GRAVITY
Hypersthenuria: Concentrated urine.
Dog: > 1.012-1.020.
Cat: > 1.020-1.030

This is an excellent test of renal function. Concentrating the urine is the hardest thing for the kidney to do. It requires the building of a gradient in the renal medulla of sodium and urea. In order to build this gradient, sodium has to be extracted in the thick ascending loop of Henle in an area impermeable to water. That is the first thing to fail in renal insufficiency resulting in a decreased urine specific gravity on the way to isosthenuria. So – with early renal disease PRIOR to overt azotemia we will see a decreased specific gravity along with signs of polyuria and polydipsia.

Isosthenuria: Urine specific gravity like the serum.
Dog: 1.008-1.010.
Cat: 1.008-1.020

Solute is being filtrated but not concentrated, the kidneys are not functioning if the hydration status of the dog or cat is consistent with concentrated urine. In other words a random specific gravity of 1.010 in a dog or cat could be normal, but not in the face of dehydration! That is why it is so crucial to obtain urine for a specific gravity prior to fluid therapy to differentiate pre renal from renal azotemia.

Hyposthenuria: Urine has been actively diluted.
Dog and cat < 1.008.
The kidneys are working well, and this could be normal as well if the animal is overhydrated or has just drunk a lot of water. If that is not the case, it means that the ADH induced reabsorption of water in the distal tubule and collecting duct is not functioning. Some sort or primary or secondary, central or nephrogenic diabetes insipidus(DI). An example in cats if hyperthyroidism which can induce a secondary nephrogenic DI.

URINE DIPSTICK
Urine pH
Urine pH is a window into the acid base status of the cat as well as an extremely important factor in monitoring and preventing crystal and stone production. Daily fluctuations in pH are normal as are fluctuations at different times of the day. This is especially true in relation to diet and timing after eating. The alkaline tide is a normal postprandial wave of alkaline pH that affects the blood and the urine. This will happen even on an acidifying diet. Therefore when monitoring pH, do so on multiple days and at different times during the day as well as fasted and after feeding before making important therapeutic recommendations.

Urine glucose
Obviously glycosuria is essential in the diagnosis of diabetes mellitus in cats but not all glycosuric cats are diabetic. They could also have:

1. Stress hyperglycemia. As long as they have been stressed for long enough for high blood sugar to effect the urine they could have glycosuria. A serum fructosamine test or repeated monitoring should solve this dilemma.
2. Fanconi’s syndrome or primary renal glycosuria. These syndromes of specific defects in the proximal tubule where glucose is reabsorbed are rare in cats but can occur.
3. Tubular damage with renal disease. This is actually common in cats especially with acute renal damage and could be an early marker for such damage.

Urine protein
As our understanding of proteinuria and our ability to detect small amounts of protein increases so does our knowledge of its importance. Cats with renal disease can have proteinuria which is likely detrimental to their kidneys even when the primary insult is tubular and not glomerular. There is recent evidence showing that even a protein creatinine ratio of 0.4 (normal for most laboratories) is a negative prognostic indicator for cats with renal disease. There are problems with relying on a dipstick though to evaluate protein:

1. The amount the dipstick picks up depends on urine concentration therefore it has to be normalized for concentration or urine creatinine (P/C ratio).
2. There are many false negatives and false positives. A more accurate method employed in many labs (not on the dip stick) is the SSA (sulfasalycilic acid) technique.
3. Minute concentrations of albumin (microalbuminuria) measurement require a specific test.

URINE SEDIMENT
A fresh urine sediment evaluation should be part of any urinalysis. This should be done fresh, in house within an hour of urine collection and prior to any refrigeration. This is especially important for crystal analysis. Once the urine has sat for over an hour or has been refrigerated the in vitro crystallization that occurs makes analysis of any crystals impossible. Sediment analysis:

1. WBC and Bacteria – A good indicator for UTI. But pitfalls:
   a. Don’t over-interpret bacteria. Not every round little moving dot is one.
   b. If the urine is dilute (<1.012 s.g.) they may be there but we miss them. So when in doubt culture if that is the case.
   c. Cats with chronic renal disease are prone to UTIs and may not all have an active sediment. So – when in doubt – CULTURE.
2. RBCs – Can be normal in a Cystocentesis to have some but not many and not all the time. If persistently positive suspect renal or lower urinary tract hematuria

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3. **Cancerous cells** – urine cytology should be performed in any case of suspected transitional cell carcinoma or any other bladder tumor.

4. **Crystals** – invaluable when monitoring for stone dissolution or prevention as well as in cases of hematuria. Has to be done FRESH.

5. **Casts** - Granular casts are a sign of necrotic tubular cells sloughing into the tubular lumen and into the urine. This is an early indicator of renal damage! When monitoring for nephrotoxicity, this (along with decreased specific gravity) is a good way to find it early.

**CONCLUSION**

Cats with renal disease should be monitored with urinalysis frequently. This is an easy, cheap and non-invasive way of gaining all the above information, and is just as important or more than serum creatinine and BUN.