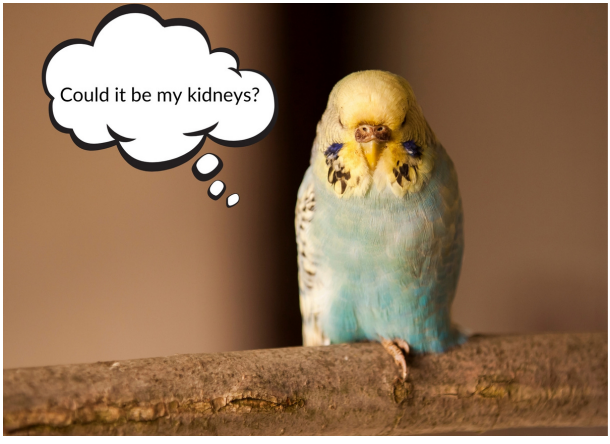


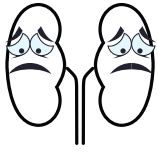
Chemistry and urine analysis ??

Detecting renal disease in birds antemortem remains challenging despite the common finding of renal disease noted by pathologists on postmortem investigation. This is in part due to a fascinating compensatory mechanisms that allow for better preservation of renal blood flow along with water and electrolyte loss within the distal intestinal tract in the face of renal disease. Causes of renal disease include infectious nephritis, hypovitaminosis A, heavy metal intoxication, and renal neoplasia.

Birds produce very little urea or creatinine. Phosphorus is not usually elevated in renal disease. **Uric acid** is actively secreted by the renal tubules and is the main chemistry analyte available to assess kidney function. The limitation is, renal tubular function must be significantly impaired before uric acid values increase. Paying attention to an individual's baseline uric acid may be helpful compared to published reference ranges as they can vary greatly in granivorous birds.

The authors Alexandra Scope et al. note in their laboratory that over 60% of granivorous patients have a uric acid below 375 umol/l. They become concerned when laboratory values are over 475umol/L. Direct extrapolation to our lab can not be made but rising trends should be noted as they may be important.

Despite dehydration thought to have minimal impact on serum uric acid it is advised to provide supplementary **fluids** for two days before **rechecking a fasted** uric acid value. Marked post prandial elevations are possible in carnivorous birds. Very high protein diets could in theory impact other species. Persistent uric acid elevations after fluid therapy are suggestive of renal disease.



A urine analysis is indispensable in mammalian species. In birds this is rarely performed as urine needs to be free from urates for accurate investigation. This is hard in normal patients due to the small volume of urine that occurs along with a variable amount urates. In polyuric patients suctioning the urine fraction from the droppings collected off a non-absorbent surface is possible and may provide useful information. Take note that polyuria can be seen with stress. Stress causes urine to be voided before it has time to move into intestines to be reabsorbed.

What makes up a urine analysis in a bird?

First things first, start off with a macroscopic examination of the droppings which will contain urine, urates and feces.

Appearance:

Urine is typically clear and urates are pure to creamy white to pale yellow or light beige.

Color Change:

Urine specific gravity, water soluble B vitamins, food pigments and medications can cause discoloured urine.

Berries can cause **red/bluish** discoloured urine and urates.

Red urine could could be due to pathology in the cloaca, genital tract or caudal intestine. Hematuria associated with renal disease is noted rarely and only with severe damage or failure. Lead toxicoses can cause hemoglobinuria and either red, pink or tan brown urine.

Liver disease can cause **greenish** to yellowish to **dark yellow** urates as well as yellow to green tinged urine.

Urine Specific Gravity - in most polyuric patients is 1.005 to 1.020 but it varies considerably and only of use if reading consistently low.

Urine Strip - **pH** is going to be highly variable and of limited clinical use due to the impact of diet and egg laying. **Protein** in the urine fraction should be zero to trace but fecal contamination, hematuria or hemoglobinuria can impact the results. **Glucose** in trace amounts could be stress, fecal contamination or renal tubular injury. Truly diabetic birds with polyuria are expected to have very high levels of urine glucose. **Ketonuria** is possible with starvation/negative energy balance or diabetes. **Blood** should be negative. Note **birds produce biliverdin** not bilirubin.

Microscopic Examination- a 100% urate free sample is impossible and makes exam a challenge. A stained sediment can help delineate casts and cells. Casts are supportive of renal disease. Small numbers of red cells may be significant in a clinically ill patient (>2 RBC/hpf) but could originate from the intestinal or urogenital tract. White blood cells are always a concern and could represent infection or injury but again may come from cloaca or urogenital tract.

Reference:
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