



## **Struvite Urolithiasis**

### **Recommended Diagnostics**

- CBC and Serum Chemistry
  - Not a priority if trying to save money and patient is well otherwise
  - Consider renal panel if unwell or inappetent or if urine specific gravity is <1.020
- Urinalysis
  - Analyze sample immediately after collection because struvite crystalluria develops over time in storage, especially with refrigeration
  - Struvite crystals may form in alkaline urine (pH > 7.5), but alkaline urine alone does not predispose to struvite stones
- Urine culture and MIC
  - Staphylococcus, Proteus, Klebsiella, Ureaplasma, Pseudomonas, Enterococcus and some E.coli's form ureases and are often associated with struvite stones
- Abdominal radiographs
  - About 30-40% of nephroliths in dogs are calcium oxalates
  - Most struvites are in the lower urinary tract

### **Recommended Treatment**

- Struvite stones may be dissolved with diet and antibiotics, urinary acidifiers and antibiotics, and sometimes with antibiotics alone.

- Urinary diet
  - Dissolution diets for struvites: Hill's S/D, Royal Canin SO
    - Average time to dissolution is 3 months
    - Stone should be 50% smaller at 1 month mark. If not, repeat culture and assure diet compliance.
  - Maintenance diets for prevention of struvite stones are not needed 99% of the time because prevention is through prevention/treatment of UTI's.
  - Canned food or soaked kibble will increase water consumption/promote urine dilution

- Urinary acidifiers
  - May be used in place of diet for dissolution of struvites (along with an antibiotic), but not as reliable. This may save cost of diet, however.
    - Average dissolution time for acidifiers and antibiotics is 1-4 months
  - Do NOT use for calcium oxalates
  - Struvites dissolve at pH 6.3
  - Options
    - d,L methionine
      - 75-100 mg/kg PO q12h
    - ammonium chloride
      - 20 mg/kg PO q8h
    - Vitamin C
      - 30 mg/kg PO q8h
      - May cause false negative urine glucose readings
- Increased water consumption
  - Canned food
  - Add water to food
- Antibiotics if culture positive
  - Treat for a minimum of 4-6 weeks in presence of stones
  - Choose antibiotic based on the MIC
    - Remember Enterococci are inherently resistant to most cephalosporins
- Voiding urohydropropulsion
  - Successful for stones measuring 1-3 mm in male dogs and 10-15 mm in female dogs
  - Procedure: Under anesthesia, catheterize bladder and remove urine. Then distend bladder with saline and invert patient (legs in air) while squeezing the bladder to force the stones out.
    - Always submit for analysis. It's cheap!

### **Monitoring/Prevention**

- Recheck urinalysis and culture 1 week after finishing antibiotics for UTI and until stone is dissolved
- Recheck abdominal radiographs or ultrasound one month later to measure stones
- Recheck urinalysis and culture every 3-6 months.
  - Keeping urine sterile is key to prevention

\*\*If finances are severely limited and stone type is unknown, the clinician may try a month of amoxicillin, cephalexin, ciprofloxacin, or TMS and either Hill's s/d diet or a urinary acidifier. If stone is not smaller in one month, stone is likely not struvite. \*\*

\*\*If client cannot afford diets, use urinary acidifiers instead and aim for a urine pH of <6.5\*\*

