What underlying conditions predispose dogs to uroliths?

The two most common kinds of urinary stones in dogs are struvite stones and calcium oxalate stones. The vast majority of struvite stones in dogs are related to an underlying urinary tract infection (UTI). Female dogs are more susceptible than males to UTIs for a variety of reasons, including their shorter and wider urethra, which makes it easier for bacteria to pass into the bladder. ¹

What is the treatment for struvite stones?

It is essential to first treat the underlying UTI. Diagnosis can be challenging, since symptoms may go unnoticed until the struvite stone is large enough to cause urinary discomfort. While antibiotic therapy can reduce the size of stones, I recommend feeding a diet designed to dissolve the stones in addition to administering an antibiotic to hasten stone dissolution. The treatment period can range from 4 to 16 weeks.

If a dog develops another struvite stone following successful treatment, the problem is considered chronic. Dogs with recurrent stones should have a urine culture repeated every 2 to 3 months to monitor for new infections. Unfortunately, many veterinarians skip this step and end up repeatedly treating dogs for struvite stones. It’s also essential to determine what underlying factors make the dog predisposed to urinary infections. Sometimes it’s a congenital abnormality of the ureter, urethra or bladder; in other cases, we suspect it’s caused by a dysfunction of the local immune system that is difficult to identify with certainty.

What are the components of a urinary diet for struvite stones?

The formulation of urinary diets has evolved over time. The original urinary diets designed for struvite dissolution in dogs were low in protein, but low-protein diets are not appropriate for long-term feeding. They are also formulated to be acidifying and lower in crystal precursor minerals to encourage stone dissolution. Added dietary sodium can also help by diluting the urine.

Does diluting the urine also help in the management of calcium oxalate stones?

More needs to be understood about the formation of calcium oxalate stones, which are completely different from struvite stones. Unlike struvite uroliths, calcium oxalate stones cannot be dissolved with diet. Treatment for calcium oxalate stones consists of surgery or a voiding hydropulsion procedure that facilitates stone removal. Some dogs can be treated using laser lithotripsy to fragment larger stones prior to their nonsurgical removal.

However, it is believed that diluting the urine via dietary sodium may be helpful in reducing the rate of recurrence.² Animals that don’t drink enough have higher concentrations of crystal-forming minerals. Three ways to accomplish urinary dilution are:

- Feed canned food
- Add water to the dry food and feed it in a slurry (some dogs love this; others don’t)
- Feed a dry food with added sodium that will increase thirst, cause the dog to drink more water and dilute crystal precursors in the urine.

It is also important to ensure that fresh water is always available to encourage drinking.

Added dietary sodium facilitates urine dilution, which may help prevent urinary stone formation.

A New Nutritional Option for Canine Urolith Management

Whether managing struvite or calcium oxalate bladder stones in dogs, a critical objective of urinary diets is to increase water intake. While many veterinarians recommend canned diets for urolithiasis patients, some dogs refuse to eat canned food. This led to the development of Purina® Pro Plan® Veterinary Diets new UR Urinary® Ox/St™ dry Canine Formula as an additional dietary option. Pet owners can be assured that this formula will provide the same high-quality Purina nutrition as the canned formula.

Role of dietary management
Increasing water consumption helps dilute the urine and ensure that the pet urinates more frequently because the urinary system is flushed out more often, there is less opportunity for crystals to form. In line with current medical knowledge, when formulating a dry urinary diet, the amount of sodium should be increased over that of well-pet dog food to facilitate increased water consumption. A urinary diet should also be designed to provide a moderate calorie content and proper balance of total nutrients, while avoiding an imbalance of the minerals (e.g., calcium, magnesium, phosphorus) involved in stone formation.

Assessing efficacy of a urinary diet
Relative Super Saturation (RSS) and Activity Product Ratio (APR) are advanced methods used to measure the effect of diet on the likelihood of urolith formation.

- **RSS** is determined by measuring urine pH, urine volume and uric acid components.
- **APR** assesses the cumulative effect of all urine crystal growth promoters and inhibitors by observing if a crystal placed in the urine grows or dissolves.

**RSS AND APR INTERPRETATION**
- **Rss** = Activity product
  - Solubility product
  - RSS
  - Most struvite uroliths in dogs are caused by urinary tract infections. In the case of non-sterile struvite uroliths, it is important to treat with the appropriate antibiotic in addition to dietary management.
  - RSS AND APR INTERPRETATION
    - RSS: Crystals do not precipitate, aggregate or grow. Existing struvite crystals and uric acid dissolve.
    - APR: Crystals do not form. Existing crystals may aggregate. New crystals and uric acid exist.

**METASTABLE SATURATION**

**OVERSATURATION**

**Urolithiasis**

**INTRODUCING Purina® Pro Plan® Veterinary Diets UR Urinary® Ox/St™ Canine Dry Formula**

**Diet characteristics**
UR Urinary Ox/St is formulated to:
- Promote the production of urine unfavorable to the development of sterile struvite and calcium oxalate crystals.
- Provide a moderate calorie content to maintain ideal body condition.

**Medical indications**
Canine diets with these nutritional modifications have been recommended for adult dogs to help with the following:
- Dissolution of sterile struvite uroliths
- Reducing the risk of calcium oxalate urolith recurrence
- Reducing the risk of sterile struvite urolith recurrence

**Medical contraindication**
- Hypophosphatemia

**Dogs with urolithiasis can present with clinical signs similar to multiple disease processes. A comprehensive workup for urinary signs includes urinalysis, urine culture, radiographs, ultrasound and bloodwork. If clients have financial constraints, confirming the animal is not blocked and approaching diagnostics in a stepwise manner is acceptable.**

**Use overall health as a guide**
For otherwise healthy animals with little or no prior urinary health problems, my first recommendation is a urinalysis. If the urinalysis reveals a UTI, I prescribe an empirical antibiotic for 10 to 14 days. If crystals are present, that patient should have a radiograph of the uracal tract to screen for radiopaque stones. Patients with a history of complicated UTIs or underlying systemic diseases (hyperadrenocorticism, diabetes mellitus, etc.) and those with chronic cystitis or chronic bacterial prostatitis should be monitored for urolith recurrence. Polyuric patients often harbor subclinical urinary tract infections.

**Maintain at-home care**
Pet owners must be vigilant when feeding prescription diets. Stopping the diet, mixing it with other food or even providing too much treats greatly increases the risk of urolith recurrence. Once stones have been successfully removed, urinalysis should be done on patients monthly for the first 3 months, then biannually to screen for abnormalities.

**Diets for reference**
- **UR Urinary® Ox/St™**
- **Purina® Pro Plan® Veterinary Diets**

**Tailoring Client Recommendations, Case by Case**

**Emphasize follow-up visits**
Upon diagnosis of urolithiasis, the clinician should emphasize the importance of follow-up appointments. Dogs on a dissolution diet should have repeat radiographs in 2 to 4 weeks. If the stone is not responsive to dietary and antimicrobial therapy after the first 4 to 8 weeks, surgery needs to be considered. A repeat urinalysis with or without a urine culture after treating with antibiotics is essential.

**Urolithiasis warning signs**
Pet owners should have their dogs evaluated at the first sign of urinary problems. These signs include:
- Incontinence or inability to control urination
- Strained or painful urination
- Frequent, small volumes of urine
- Blood in the urine

**Key Takeaways**
- The two most common kinds of urinary stones in dogs are struvite stones and calcium oxalate stones. Struvite stones can be dissolved with dietary management; calcium oxalate stones cannot.
- Most struvite stones in dogs are related to an underlying urinary tract infection. Treating non-sterile uroliths with the appropriate antibiotic is critical in addition to dietary management.
- Diets and feeding practices that increase water intake help dilute the urine and ensure that the pet urinates more frequently, providing less opportunity for crystals to form.