

Management of Struvite Urolithiasis and Crystalluria in Cats



Julie Byron
DVM, MS, DACVIM
The Ohio State University
Veterinary Medical Center

Half the feline uroliths submitted to American analysis centers are composed primarily of struvite.¹ Although this proportion is less than 30 years ago, when nearly 90% were struvite, they still present a significant cause of urolithiasis.

There is often confusion as to when a diet that addresses struvite saturation is warranted. Frequently the presence of struvite crystals in the urine or a urine pH above 7.5 are what triggers the use of a struvite dissolution or prevention diet in cats, even in the absence of lower urinary tract signs. In general, struvite crystalluria is benign and a common finding in concentrated urine. Therefore it is important to review the mechanisms of struvite crystalluria and urolithiasis, as well as the criteria for treatment and options.

The precipitation of struvite into crystals or uroliths depends on many factors including the degree of urine saturation, the presence or lack of promoters and inhibitors of precipitation, the diet, the pH of the urine, and volume of the urine. It is important to remember that urine that has been collected by the owner or in the clinic can change in character before analysis under many conditions. In order to avoid false readings, be sure to examine a fresh urine sample within minutes of collection to minimize the risk of *ex vivo* crystal formation. In addition, all types of crystals precipitate more readily in colder temperatures, so it is important

to know if urine that is being analyzed was refrigerated. In addition, rewarming the urine to room temperature or even body temperature will not necessarily cause newly formed crystals to dissolve.

Struvite Crystals

In general, struvite crystals are not pathogenic in most patients. Struvite crystals will form in concentrated urine, even at a pH down to 6.5. Crystals have not consistently been an indicator of the presence of stones. For example, less than 50% of cats with calcium oxalate stones have calcium oxalate crystals found in their urine sediments.² Thus, even without crystalluria, if lower urinary tract signs are present, imaging must be performed to rule out urolithiasis.

Struvite Stones

All uroliths are pathogenic. Similar to crystalluria, struvite uroliths are most likely to form in concentrated urine, and urine of a pH above 6.5. They appear slightly less radiopaque than calcium oxalate uroliths (unlike in dogs) and tend to be smooth and rounded. Some may have a core of one mineral, while the majority of the shell is made of another. Most cats with struvite uroliths are between 1 and 10 years of age.

When should intervention of struvite crystalluria occur?

There are several instances in which struvite crystalluria should be addressed by increasing water intake and dietary modification. These include their presence in a known stone former, patients with lower urinary tract signs, male cats with a history of urethral plug formation or urethral obstruction, and patients with persistent, significant crystalluria found on multiple fresh urine samples.

Treatment and Prevention

Fortunately, struvite uroliths can be dissolved by diluting the urine, altering the urine pH and decreasing the substrate components. Diet parameters for treatment and prevention of struvite uroliths include increased water intake through either increased salt or use of canned formulations, decreased phosphorus and magnesium, moderate acidification, and a lower carbohydrate content. Cats that have formed struvite uroliths are likely to benefit from a preventive diet after dissolution or removal. There are several dissolution and prevention diets available in both canned and dry forms for cats. Most have been shown to dissolve uroliths in less than 4 weeks if fed as the sole diet. **BLUE Natural Veterinary Diet W+U Weight Management + Urinary Care** is one of these that is showing success in ongoing clinical trials.



2.5-year-old female spayed domestic shorthair with struvite cystolithiasis



References

1. Osborne CA, et al. Analysis of 451,891 canine uroliths, feline uroliths, and feline urethral plugs from 1981 to 2007: Perspectives from the Minnesota Urolith Center, *Vet Clin Small Anim* 39 (2008).
2. Bartges JW, Feline calcium oxalate urolithiasis, *J Feline Med*, 18 (2016).