Cystine Urolithiasis in Dogs and Cats
Jodi L Westropp DVM, PhD, DACVIM

This protocol is intended only as a guideline. For specific questions, please do not hesitate to contact the laboratory.

Cystine-containing uroliths constituted only 1.3% of the canine uroliths submitted to our laboratory over the past 20 years. These developed more often in younger male dogs, and the following breeds are at increased risk: Newfoundland, English Bulldog, Dachshund, Chihuahua, miniature Pinscher and Welsh Corgi. An increased risk for the Bullmastiff and Scottish Deerhound has also been reported.

A genetic mutation in the canine SLC3A1 gene predisposes dogs to developing cystinuria and cystine uroliths. A test for this mutation in Newfoundlands has been available for several years, which may have contributed to the decrease in cystine-containing uroliths observed during the past 10 years. As genetic studies continue, breeders can identify dogs that are clinically normal carriers and choose not to mate pairs that could yield affected offspring.

Genetic mutations in other breeds have also been investigated, including in cystinuric Labrador Retrievers; the defect resembles that described for Newfoundlands. For more information regarding genetic testing for dogs with cystinuria, please see the following website: http://www.vgl.ucdavis.edu/services/Hyperuricosuria.php

Unfortunately, cystine uroliths frequently recur following removal. The following factors can be considered for managing dogs with cystine urolithiasis.

1. Dietary management can include feeding an appropriate diet that is **high in moisture and low in protein.**
   a. Canned diets are usually easiest; however, the patient can also be fed a dry diet mixed with water on a 1 to 5 volume basis. The water should be added gradually over 3 to 4 weeks so diarrhea does not develop.
   b. Other options include diets low in sulfur amino acids, such as vegetarian diets (see below). Any of the diets should produce an alkaline urinary pH; potassium citrate can be considered if needed.

2. **Dilute urine and frequent urination** is critical for managing patients with any type of urolithiasis. Reevaluate the animal in four to six weeks (or after the owner feels they have increased the moisture content appropriately) followed by regular monitoring of specific gravity and presence of crystals.
a. If specific gravity is not ideal (<1.020 for dogs, <1.025 for cats), add more water to the diet.

3. Drug therapy

a. If dietary strategies have failed, the thiol-containing drugs can be considered.

b. Thiola (also known at 2-MPG, and Tiopronin) can be administered. This drug reacts with cystine, resulting in conversion to a more soluble compound. Side effects can occur and include gastrointestinal upset, behavioral aggression, blood dyscrasias and elevated liver enzymes. This drug has also been reported, in conjunction with diet, to dissolve cystine uroliths in some patients.

Cystine uroliths are extremely rare in cats; they accounted for only 0.15% of the feline uroliths analyzed at our laboratory. Cystine uroliths are uncommon in young cats; most are observed in middle aged to older cats. Most cats with cystine uroliths are domestic short haired, but Siamese cats appear slightly over-represented. Although the cause of cystine uroliths in the cat is unknown, the etiology is thought to be similar to the canine.

In addition to increasing urine volume in cats with cystine uroliths, cystine becomes more soluble as the pH increases. Therefore, a non-acidifying canned food seems appropriate for these patients. For more specific treatment regarding this type of stone in the cat, please feel free to contact the laboratory.

Client information sheets regarding urolithiasis are available here:
http://www.vetmed.ucdavis.edu/vmth/small_animal/nutrition/client_info_sheets/uroliths.cfm

If you are a veterinarian and wish to discuss specific dietary recommendations for your case, please contact the G. V. Ling Urinary Stone Analysis Laboratory (530-752-3228 or stonelab@ucdavis.edu)
OR the UC Davis Nutrition Support Service (530-752-7892 or nssvetmed@ucdavis.edu)

* As a public institution, UC Davis does not endorse any particular brand or type of pet food. The higher moisture content of canned formulations is helpful in stone prevention. Any dietary management plan should take into consideration concurrent diseases and other individual client and patient factors. Dietary management plans for any patient that is overweight, or that has a low energy requirement, or that has any other concurrent disease should be individualized to optimize efficacy and avoid problems. The reader is encouraged to discuss dietary strategy with a veterinary nutritionist; a customized approach is often indicated. There are large variations in the nutritional profiles of various diets marketed for urolithiasis management (see list below), while many other diets can be effectively used ‘off-label’ for this purpose.

Commercially Available Diets Used for Management of Canine Cystine Urolithiasis:

1. Hill’s Prescription Diet Canine u/d canned and dry
2. Royal Canin Veterinary Diet Canine Urinary UC Low Purine dry
3. Royal Canin Veterinary Diet Canine Vegetarian canned and dry
4. Purina Veterinary Diet HA Hypoallergenic Canine Formula dry
5. Hill’s Prescription Diet Canine d/d Rice and Egg dry