Minnesota Urolith Center

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CANINE CYSTINE UROLITHS

Cystinuria is an inherited defect in the transport of cystine. Cystine and several similar amino acids are normally reabsorbed by the renal tubules. Cystinuric dogs fail to reabsorb cystine from glomerular filtrate. The subsequently higher urine concentration of cystine is an important risk factor for urolith formation. As in humans, the transportation defect in dogs appears to be genetically heterogeneous[1].

Epidemiologic studies of uroliths submitted to the Minnesota Urolith Center indicate that male dogs (98%) are more commonly affected than females (2%). Common breeds affected include: Newfoundlands, Dachshunds, Mastiffs, Bassett Hounds, Staffordshire Bull Terriers, and Bulldogs. The mean age at time of urolith retrieval was 4.8 ± 2.5 years.[2]

Medical Considerations:

- Urine nitroprusside test is an effective screening test for cystinuria.
- Genetic tests for Newfoundlands and Labrador retrievers are available at the University of Pennsylvania (research.vet.upenn.edu/penngen) to identify genetic carriers and affected dogs.

Nutritional Considerations:

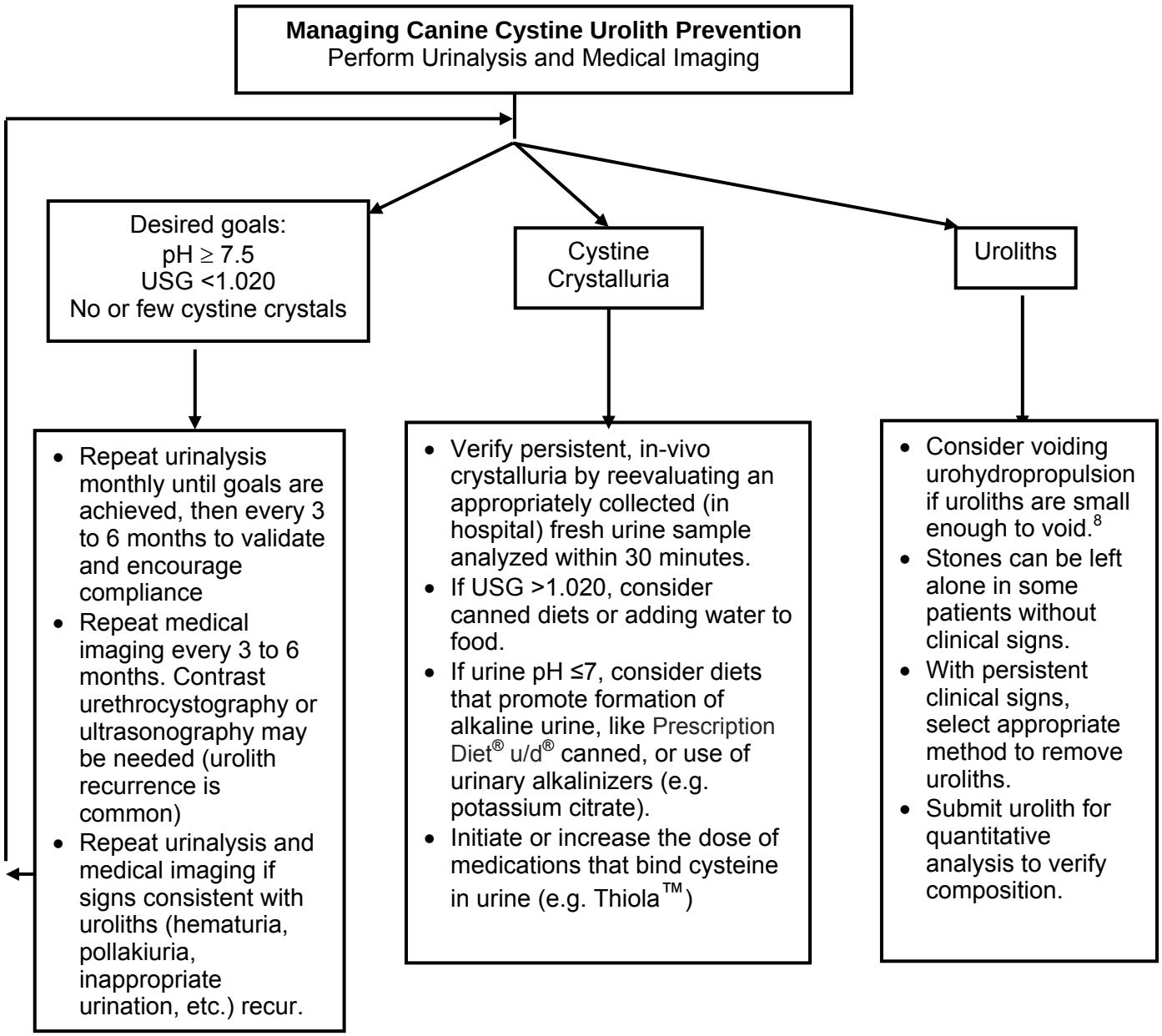
- Avoid diets that promote urine acidification. Alkaluria promotes dissolution of cystine.
- High moisture foods (i.e. canned formulations) are more effective because increased water consumption is associated with decreased urine concentrations of calculogenic minerals.
- Limit excretion of amino acids such as cystine by feeding a low protein diet.
- Limit sodium intake. In cystinuric humans, dietary restriction of sodium reduced the urinary excretion of cystine.[3]
- Diets like Prescription Diet® u/d® canned diet fit these criteria. [4]

Pharmacological Considerations:

- For dissolution: In additional to dietary changes, administer n-(mercaptoropionyl)-glycine (2-MPG) (Thiola™) at an approximate dosage of 15mg/kg every 12 hours. Thiola™ binds with cysteine molecules to form a complex that is more soluble in urine than cystine.
- Administration of alkalinizers may be necessary to maintain urine ph of ≥7.5.
- For prevention: If diet alone is ineffective, consider addition of Thiola™ at 10 to 30mg/kg/day to maintain a urine cystine concentration below 200mg/L.

Consider these facts:

- Experienced surgeons failed to remove all uroliths in 15% of dogs.[5,6] Therefore, be diligent during surgery, and perform medical imaging immediately following surgery to verify complete urolith removal.
- Pilot studies performed on cystinuric dogs at the University of Minnesota revealed a 20% to 25% reduction in 24-hour urine cystine excretion during consumption of Prescription Diet® u/d® canned diet compared to a canned maintenance diet.[2]
- Cystine uroliths are highly recurrent.
- With increasing age, dogs appear to have a decrease in cystine urolith formation.[7,2]
- Cystine uroliths are marginally radio-opaque. Contrast urethrocystography or ultrasonography may be needed to detect uroliths.



**We advise reviewing manufacturer's literature regarding selected therapeutic foods to determine indications and contraindications. For pets with multiple health concerns, we suggest that the selection of diet should take into consideration all health needs of the pet.

Further references:
[1]Casal ML, et al: Inheritance of cystinuria and renal defect in Newfoundlands. J Am Vet Med Assoc 1995; 20712, 1585-1589
[2]Osborne CA, et al: Canine Cystine Urolithiasis: Cause, Detection, Treatment, and Prevention. In: Veterinary Clinics of North America, 1999,Vol. 29:1, 193-211
[3]Norman RW et al: Dietary restriction of sodium as a means of reducing urinary cystine. J Urol. 1990; 143:1193-1195
[4]www.hillsvet.com
[5]Lulich J. Incomplete removal of canine and feline urocystoliths by cystotomy. JVIM. 1993;7:124.
[6]Grant D. Frequency of incomplete urolith removal…in dogs. JAVMA. 2010;210:763
[7]Hoppe A, et al: Cystinuria in the Dog: Clinical Studies during 14 years of Medical Treatment. In J. Vet Intern Med 2001; 15:361-367
[8]Lulich J. Voiding urohydropropulsion a nonsurgical technique. Current Veterinary Therapy XII, SAP. 1995, p1003