

Minnesota Urolith Center * UNIVERSITY OF MINNESOTA

College of Veterinary Medicine * 1352 Boyd Avenue * St Paul, MN 55108

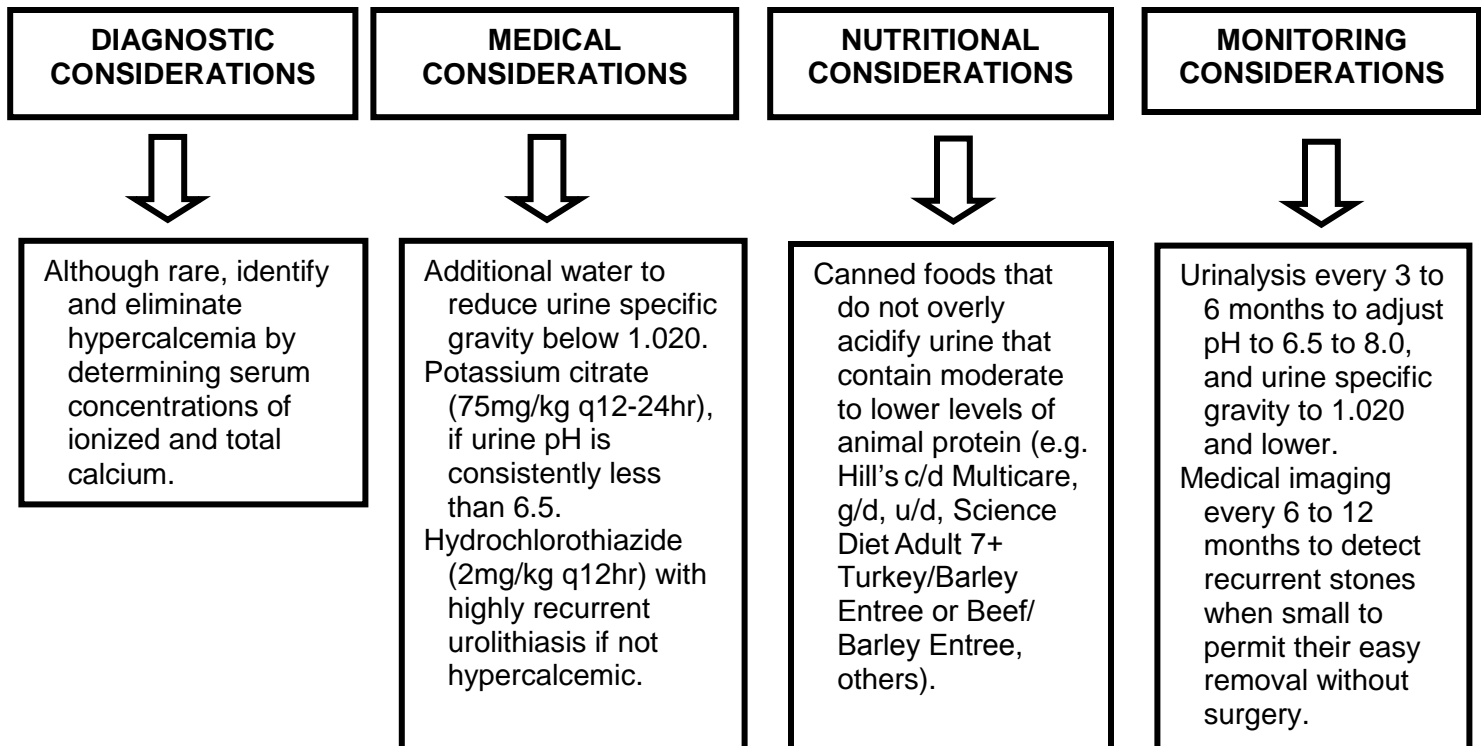
Phone 612.625.4221 * Fax 612.626.3226 * email support@urolithcenter.org

Directors: Carl A. Osborne DVM, PhD * Jody P Lulich DVM, PhD * urolithcenter.org

CANINE CALCIUM OXALATE UROLITHS

Calcium oxalate (CaOx) is a common and difficult stone to prevent because factors responsible for formation are incompletely understood. It is accepted that crystal growth and possibly initial crystal formation are at least partly a reflection of urine supersaturation. Therefore, controlling risk factors promoting urine CaOx supersaturation (e.g. hypercalciuria, hyperoxaluria, hyperaciduria, hypocitraturia, and highly concentrated urine) should minimize urolith recurrence.

PREVENTION



** Review manufacturer's therapeutic food literature to determine indications/contraindications. For pets with multiple health concerns, consult a veterinary nutritionist to select an optimal food.

In depth recommendations and references are available on our website: urolithcenter.org under the resources tab.

Minnesota Urolith Center

Carl A. Osborne, DVM, PhD
Hasan Albasan, DVM, PhD
Paige Ashton, BS
Michelle Buettner
Amy Cokley, BS
Sarah Davidson, CVT

- UNIVERSITY OF MINNESOTA
- College of Veterinary Medicine
- 1352 Boyd Avenue
- St. Paul, MN 55108
- Lab Phone (612) 625-4221
- Fax (612) 626-3226

Jody P. Lulich, DVM, PhD
Laurie Swanson, CVT
Lori Koehler, CVT
Sandy Leach
Lisa K. Ulrich, CVT

Visit our website: <http://www.cvm.umn.edu/depts/minnesotaurolithcenter>

CANINE CALCIUM OXALATE UROLITHS

Calcium oxalate (CaOx) is one of the most common stones in the urinary tract of dogs.¹ Although formation of CaOx uroliths is associated with a complex and incompletely understood sequence of events, it is accepted that initial crystal formation and subsequent crystal growth are at least partly a reflection of urine supersaturation. Therefore, controlling risk factors promoting urine CaOx supersaturation (e.g. hypercalciuria, hyperoxaluria, hyperaciduria, hypocitraturia, and highly concentrated urine) should minimize urolith recurrence.

Medical Considerations:

- Hypercalciuria, a risk factor for CaOx urolithiasis, has resulted from hypercalcemia, metabolic acidosis, high sodium consumption, and vitamin D excess. Avoid these risk factors.

Nutritional Considerations:

- Avoid calcium supplements independent of meals & high oxalate foods (e.g. chocolate, nuts, rhubarb, spinach).
- High moisture foods (i.e. canned formulations) are more effective because increased water consumption is associated with decreased urine concentrations of calculogenic minerals. Feed canned foods and/or add increasing amounts of water to food until urine specific gravity is less than 1.020.

Pharmacological Considerations:

- Consider potassium citrate (75mg/kg q12-24hr), if urine pH is consistently less than 6.5.
- Consider vitamin B6 (2 to 4mg/kg q 24 to 48 hr) in patients consuming primarily human food or diets with insufficient B6 content.
- Consider hydrochlorothiazide (2mg/kg q12hr) with highly recurrent urolithiasis in dogs without hypercalcemia.

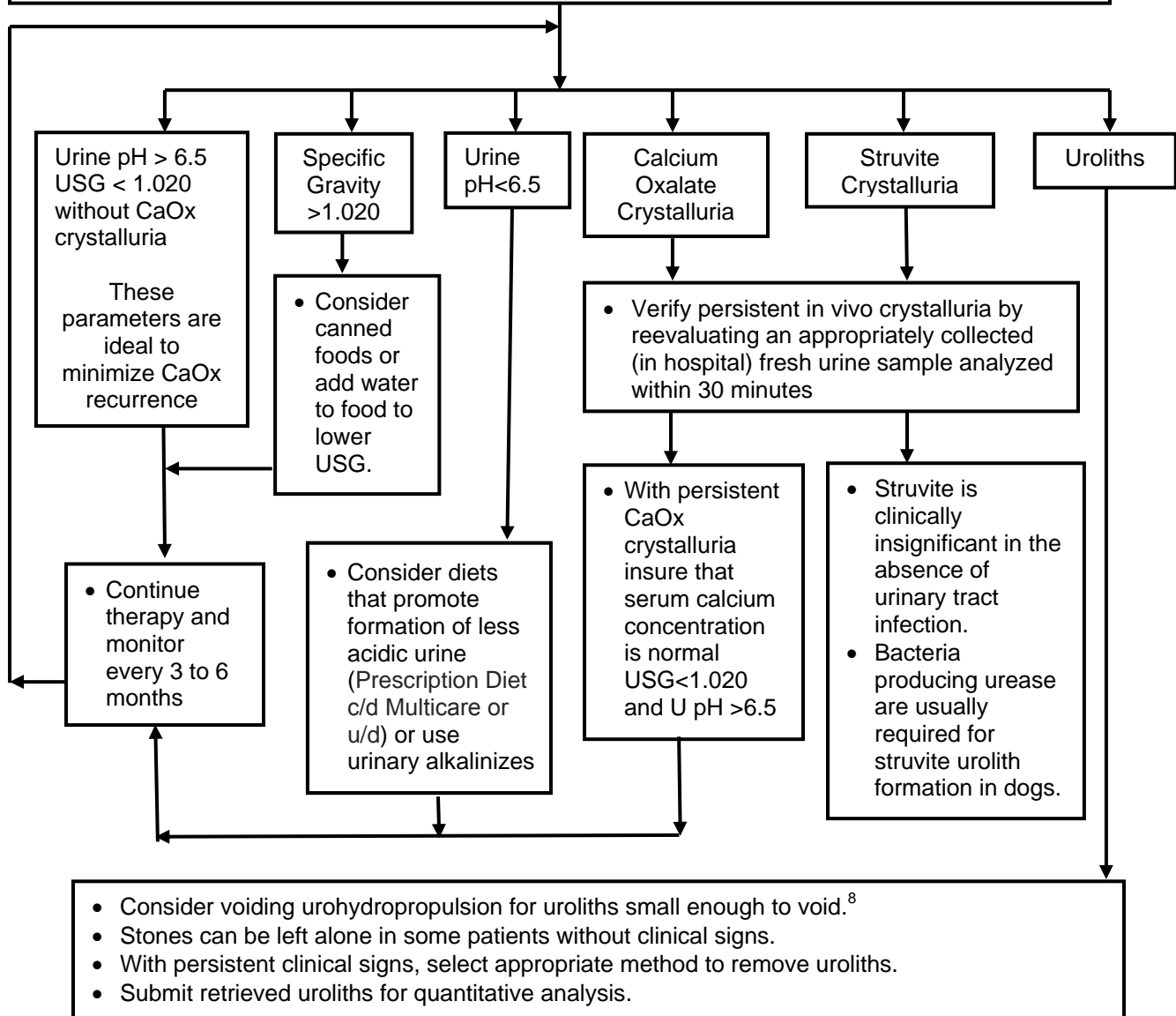
Consider These Facts:

Experienced surgeons failed to remove all uroliths in 15% of dogs.^{2,3} Therefore, be diligent during surgery, and perform medical imaging immediately following surgery to verify complete urolith removal. Studies have confirmed the ability of diets to reduce urine CaOx saturation. However, selecting the best diet is challenging because diet efficacy determined using clinically relevant endpoints (i.e. urolith recurrence), has yet to be published. Of the diets marketed to prevent CaOx, Prescription Diet[®] u/d[®] had the lowest concentrations of urinary calcium and oxalate, achieving the most appropriate pH in urolith-forming dogs.⁴ We use Prescription Diet[®] w/d[®], Prescription Diet[®] c/d[®] Multicare or Prescription Diet[®] g/d[®] to manage hypertriglyceridemic Miniature Schnauzers and dogs with multiple diseases in which Prescription Diet[®] u/d[®] is less suitable. Epidemiologic studies indicated that the strongest association between CaOx urolith formation and diet was the diets' propensity to over-acidify urine; diets promoting urine pH less than 6.59 were at highest risk.⁵ *Oxalobacter formigenes* is an intestinal bacterium that ingests oxalate as its sole nutrient.⁶ By consuming dietary oxalate in the intestine, less oxalic acid is available for absorption and less is excreted in urine. To preserve healthy populations of intestinal *Oxalobacter*, avoid indiscriminant use of antimicrobics. In a retrospective study of uroliths formed around a suture nidus, the majority were composed of calcium oxalate.⁷ To minimize iatrogenic urolith formation, use suture patterns that minimize suture exposure to the bladder lumen.

MINIMIZING CALCIUM OXALATE UROLITH RECURRENCE IN DOGS

Therapy: Long-term use of diets specially formulated with reduced levels of calcium and oxalate that promote formation of neutral to alkaline urine are essential to prevent these highly recurrent uroliths. Prescription Diet c/d Multicare or u/d and some diets for senior dogs fit these criteria.

Monitor: Urinalysis and medical imaging in 1 month and then every 3 to 6 months. Sooner in patients with recurrent urinary signs.



** Review manufacturer's therapeutic food literature to determine indications/contraindications. For pets with multiple health concerns, consult a veterinary nutritionist to select an optimal food.

- Osborne C. Analysis of 451,891 canine uroliths, feline uroliths and feline urethral plugs from 1981 to 2007. *VCNA:SAP*. 2009;39:183.
- Lulich J. Incomplete removal of canine and feline urocystoliths by cystotomy. *JVIM*. 1993;7:124.
- Grant D. Frequency of incomplete urolith removal...in dogs. *JAVMA*. 2010;210:763
- Lulich J. Calcium oxalate: biologic behavior and risk factor management. *ACVIM Forum Proceedings*, 2009,
- Lekcharoensuk C. Associations dry dietary factors and canine calcium oxalate uroliths: *AJVR* 2002; 63: 330.
- Weese J. Presence of *Oxalobacter formigenes* in the stool of healthy dogs. *Vet Microbiol Letter to editor*. 2009;137:412.
- Appel S. Evaluation of risk factors associated with suture-nidus cystoliths in dogs and cats. *JAVMA*. 2008;233:1889.
- Lulich J. Voiding urohydropropulsion a nonsurgical technique. *Current Veterinary Therapy XII, SAP*. 1995, p1003