



Faculty of Health and Medical Sciences

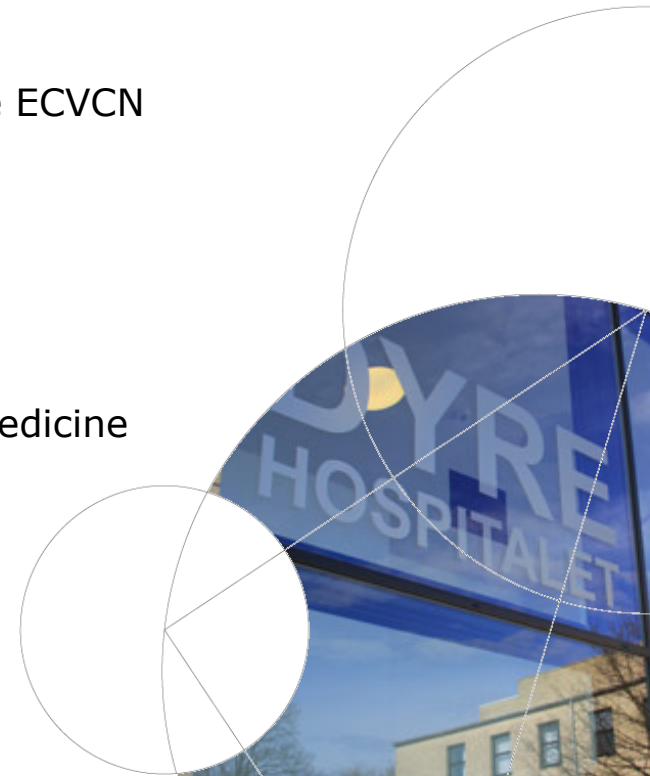


Recurrent calcium-oxalate urolithiasis in a male French Bulldog

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Agenda

1. History and Clinical presentation
2. Feeding regimen at presentation
3. CBC, biochemistry and urine analysis
4. Nutrition problem list
5. Recommendations
6. Considerations
7. Follow-up



History and clinical presentation

“Majlo”, 4.5 years old, French Bulldog, intact male

Referral from surgery (Oct 2016) for post-op nutritional management after having had a calcium-oxalate stone removed for the second time within two years

Previous injury

Carprofen 40 mg SID

Short walks mostly on leash approx. 1 h daily

BW 11.4 kg BCS 4/9



<https://www.youtube.com/watch?v=zIfIx4kyBrM>



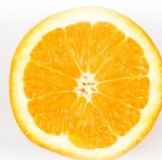
Feeding regimen at presentation

Since the first surgery (spring 2015) Royal Canin urinary s/o dry diet

Twice daily fed RC urinary s/o, dry diet

The amount of dry diet fed was measured by cup
~150g daily

Treats in the form of left overs and treats such as chicken, cheese, tomatoes and oranges were given daily in addition to the dry diet



CBC and biochemistry

RBC ($\times 10^{12}/L$)	8.56(↑)	5.5-8.5
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HCT (%)	56(↑)	37-55
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WBC ($\times 10^9/L$)	10.32	5.5-16.9
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%Neut	69.5
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%Lymph	21.6
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%Mono	7.2
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%Eosino	1.0
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%Baso	0.7
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Glucose (mmol/L)	6.18	4.11-7.95
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Creatinin ($\mu\text{mol}/L$)	123	44-159
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Urea (mmol/L)	5.8	2.5-9.6
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Phosphor (mmol/L)	0.79(↓)	0.81-2.2
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Calcium (mmol/L)	2.35	1.98-3.0
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Total protein g/L	63	52-82
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Albumin g/L	35	23-40
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Globuline g/L	28	25-45
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ALT U/L	10	10-125
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ALKP U/L	68	23-212
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GGT U/L	0	0-11
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Bilirubin ($\mu\text{mol}/L$)	4	0-15
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Cholesterol (mmol/L)	4.84	2.84-8.26
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Urine analysis

USG 1.028

pH 6

Blood 3+

Protein 1+



<http://www.medical-labs.net/different-forms-of-calcium-oxalate-crystals-344/>

Sediment analysis:

Small amount of calcium-oxalate crystals

Nutrition problem list

1. Recurrent calcium oxalate urolithiasis characterized by a urinary pH 6 and a USG of 1.028



USG <1.020 and pH 7.1-7.5 optimal to prevent calcium oxalate urolithiasis (Lulich et al. 2016)

Recommendations for preventing Calcium Oxalate uroliths

(Hand et al. Small Animal Clinical Nutrition 2006)

Obtain baseline data
(radiography, urine analysis,
serum calcium)



Eliminate iatrogenic risk factors
(acidifying food, glucocorticoids etc.)



Two to four week
follow-up
(evaluate urine
sediment and
verify diet
compliance)



Dietary modifications:

Consider:

Reduced Ca, Ox, Na, Protein
Adequate Phos and Mg
Additional water and citrate

Avoid:

Vitamins C and D
Urinary acidifiers
High Ca and Ox foods



Considerations

Predisposing factors

- Male dog, previous injury may affect ability to excrete larger crystals (Lulich et al. 1999)
- No indications of underlying disease such as **hyperadrenocorticism** (no clinical signs or abnormalities on biochemistry) or history of **glucocorticoid treatment** (Hess et al. 1999, Ritz et al. 1984).
- Calcium is in the middle of the reference interval, **ionized calcium was not measured**, though albumin levels were normal and no sign of kidney disease (no clinical signs, normal creatinine and urea, and normal USG)
- **No history** of feeding with an **acidifying diet or excessive intake** of dietary intake of **calcium, vitamin D or vitamin C** (Curhan et al 1993, Curhan et al. 1997)



Considerations

Why has the current feeding practice not had the desired effect?

RC Urinary was fed as a **dry diet**

RC Urinary is formulated to reduce minerals that are components of uroliths and to increase thirst

⇒A **pH regulating effect is not part of the strategy** in reducing uroliths for RC Urinary s/o

⇒A pH regulating effect may not be necessary for prevention in all dogs but could sometimes be necessary

In addition to the diet the **treats were high in calcium, protein and oxalate** and may therefore have reduced the effect of their regulation/reduction in the diet



Recommendations made to the owner

Switch to a **wet diet**, formulated to decrease the risk of calcium oxalate urolithiasis formation

Possible options: RC Urinary s/o wet diet, Hill's c/d wet diet, Hill's u/d wet diet, RC renal wet diet, Hill's k/d wet diet etc.

=> **The owner choose Hills u/d as they had already purchased several cans** of this diet, because they wanted to try a different brand and Hills u/d had been suggested as an option by the surgeon

Feed as strictly as possible with the diet, use the diet as **treats or at least do not feed treats that contain excess protein, calcium or oxalic acid**



Nutritional recommended allowance for a adult maintenance in a dog

Energy-calculated

Energy requirement calculations (NRC, inactive adult):

$$\text{ME(kcal)} = 95 \times \text{BW}^{0.75} = 590 \text{ kcal}$$

Energy fed as dry diet

$$\Rightarrow \sim 150\text{g} \times 3.87 \text{ kcal/g} \sim 581 \text{ kcal}$$

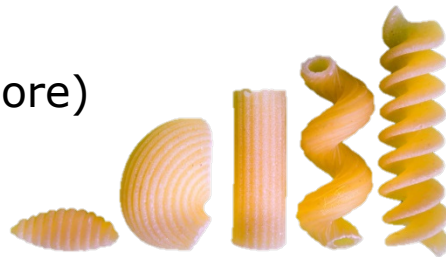
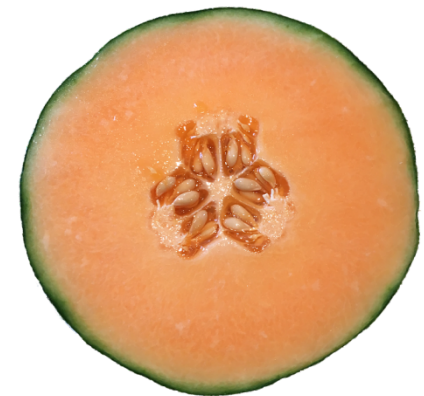
Treats were given daily in addition to the dry diet



Recommendations made to the owner

Treats low in calcium and oxalate

- cabbage
- cauliflower
- mushrooms (not raw)
- peas
- radish
- banana
- mango
- melone (cantaloupe, honey dew, water melon)
- white bread
- boiled pasta
- apples (not the core)
- boiled rice
- popcorn



Follow-up- two weeks later

The owner reported that Majlo still liked his new diet (Hill's u/d) and that it worked well to hide his medication (NSAID) inside a small ball of Hills u/d

They had also used the left over RC Urinary s/o dry diet and/or some Hills c/d as treats

Urine analysis

USG 1.032

pH 6

Sediment analysis:

Small amount of calcium-oxalate crystals



Follow-up- two weeks later

Obtain baseline data
(radiography, urine analysis,
serum calcium)



Eliminate iatrogenic risk factors
(acidifying food, glucocorticoids etc.)



Two to four week
follow-up
(evaluate urine
sediment and
verify diet
compliance)



Consider:
Reduced Ca, Ox, Na, Protein
Adequate Phos and Mg
Additional water and citrate

Dietary modifications:

Avoid:
Vitamins C and D
Urinary acidifiers
High Ca and Ox foods

Calcium
oxalate
crystalluria



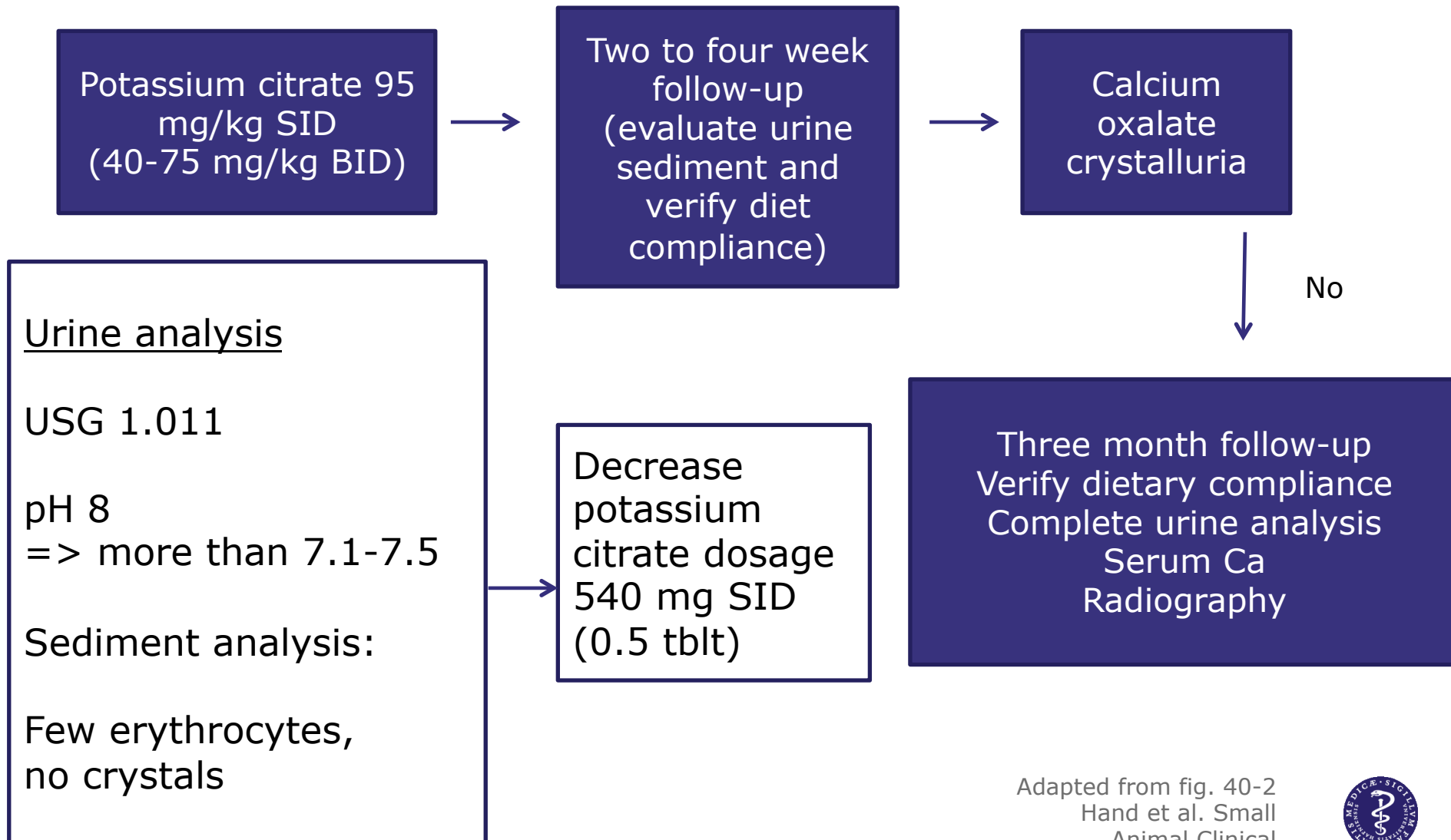
Yes

Potassium citrate
40-75 mg/kg BID

Acalca (potassium citrate)
1080 mg SID (95 mg/kg)

Mix the wet diet with
additional water

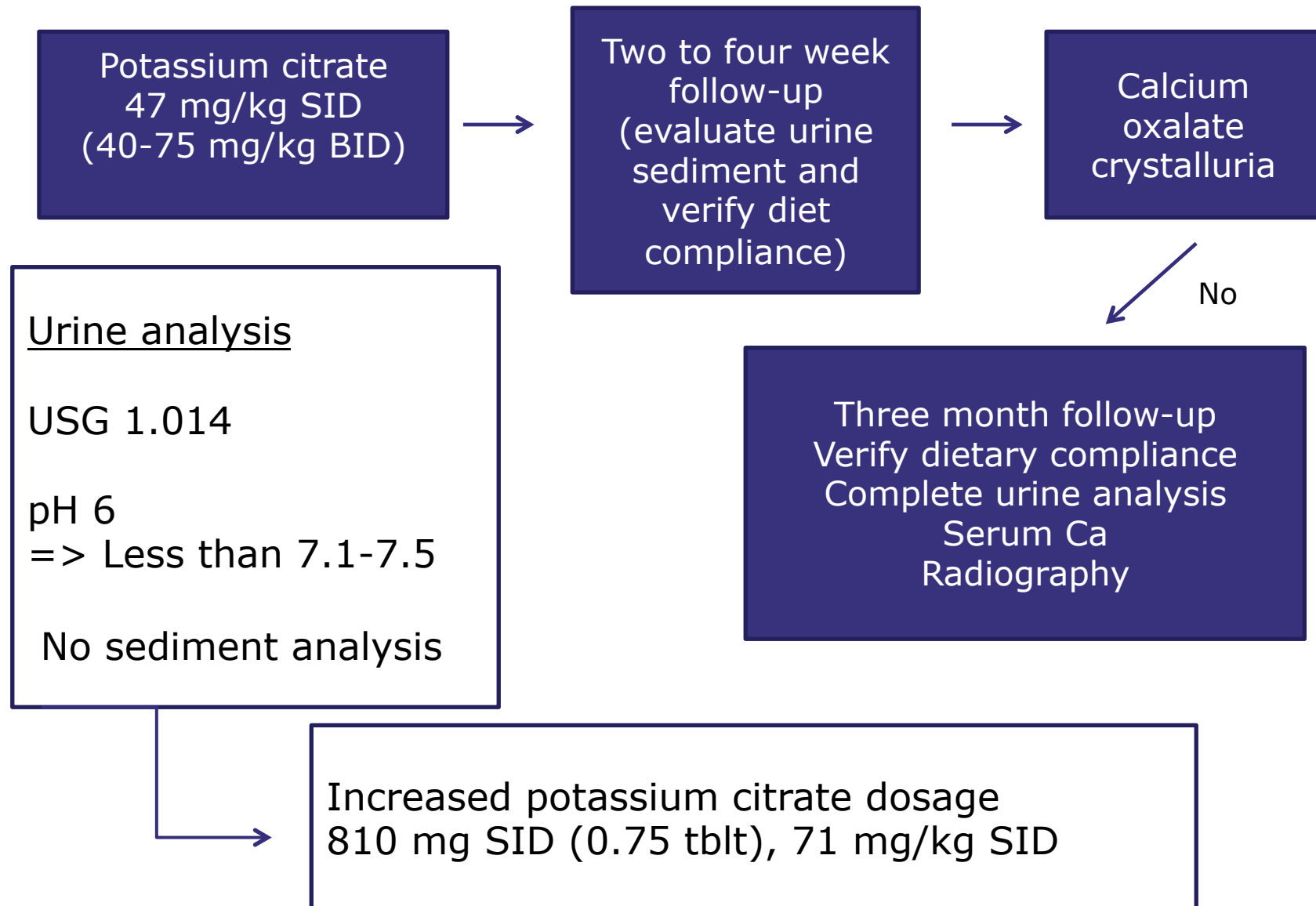
Follow-up- additional two weeks with potassium citrate



Adapted from fig. 40-2
Hand et al. Small
Animal Clinical
Nutrition 2006



Third follow-up, after 4 weeks with new potassium citrate dosage



Thank you for the attention!



References

- G.C. Curhan, W.C. Willet, F.E. Speizer, *et al.* **Comparison of dietary calcium with supplemental calcium and other nutrients as factors affecting the risk for kidney stones in women** *Ann Intern Med*, 126 (1997), pp. 497-504
- G.C. Curhan, W.C. Willet, E.B. Rimm, *et al.* **A prospective study of dietary calcium and other nutrients and the risk of symptomatic kidney stones** *N Engl J Med*, 328 (1993), pp. 833-838
- R.C. Hess, P.H. Kass, C.R. Ward **Association between hyperadrenocorticism and development of calcium-containing uroliths in dogs with urolithiasis** *JAVMA*, 212 (1998), pp. 1889-1891
- Lulich JP, Berent AC, Adams LG, Westropp JL, Bartges JW, Osborne CA. ACVIM Small Animal Consensus Recommendations on the Treatment and Prevention of Uroliths in Dogs and Cats. *Journal of Veterinary Internal Medicine*. 2016;30(5):1564-1574. doi:10.1111/jvim.14559.
- Jody P. Lulich, Carl A. Osborne, Rosama Thumchai, Chalermopol Lekcharoensuk, Lisa K. Ulrich, Lori A. Koehler, Kathleen A. Bird, Laura L. Swanson, Yasushi Nakagawa, **Epidemiology of Canine Calcium Oxalate Uroliths**, *Veterinary Clinics of North America: Small Animal Practice*, Volume 29, Issue 1, 1999, Pages 113-122, ISSN 0195-5616, [http://dx.doi.org/10.1016/S0195-5616\(99\)50007-7](http://dx.doi.org/10.1016/S0195-5616(99)50007-7).
- E. Ritz, W. Kreusser, M. Rambausek **Effects of glucocorticoids on calcium and phosphate excretion** *Adv Exp Med Biol*, 32 (1984), pp. 151-156

