

Methio-Form®

Chewable Tablets

The original chewable form of DL-Methionine for acidifying the urine of cats and dogs.

Indications: For use as an aid in acidifying the urine of cats and dogs.

Dosage and Administration: Daily dosages vary with diets and amount of acidification needed. After dosages have been determined, they may be used continuously.

Cats: The usual daily dose is 2.5 to 5.0 mEq/kg body weight or 1/2 to 1 tablet per 1 to 1.5 kg (2.5 to 3 lb) body weight. Average size adult cats normally should receive 1 1/2 to 3 tablets (10 to 20 mEq) daily.

Dogs: The usual daily dose is 2 to 4 mEq/kg body weight. Small breeds - 7 kg (15 lb) or under, 1/2 to 4 tablets daily. Medium breeds - 7 to 15 kg (15-33 lb), 2 to 7 tablets daily. Large breeds - 15 to 30 kg (33-66 lb), 4 to 13 tablets daily.

Caution: In rare cases animals may experience gastrointestinal disturbance. In those cases, administer during feeding or in two to three divided doses.

Caution: Federal law restricts this drug to use by or on the order of a licensed veterinarian.

Each scored Methio-Form tablet contains:

DL-Methionine.....500 mg (6.7 mEq)
In a palatable protein base.

Warning: Over-consumption may result if access to open bottles occurs. The effect may be severe and could result in life-threatening metabolic acidosis if veterinary treatment is not initiated.

Contraindications: Do not administer to animals with severe liver, kidney or pancreatic disease, or which are acidotic.

Important: For additional indications and information, consult package insert.

Store at room temperature and protect from light. Avoid excessive heat (104° F).

KEEP OUT OF REACH OF CHILDREN

How Supplied: Bottles of 50, 150 and 500 tablets

Introduction

DL-Methionine functions as an essential amino acid (L-form) and nutrient, a lipotrope, and a urine acidifier. Natural methionine metabolism results in the excretion of sulphuric acid into the urine, thereby creating an acidic environment in the urinary tract. In this paper, we review the beneficial effects of urine acidification in the common conditions of FLUTD and Canine Struvite Urocytolithiasis.

Feline Lower Urinary Tract Disease (FLUTD)

The overall prevalence of FLUTD in the United States has been estimated at approximately 5%¹ over the last thirty years. Based on the 2007 AVMA U.S. pet ownership survey,² such prevalence would equate to nearly four million affected cats in this country annually. Although the majority of cases are still classified as idiopathic, a growing percentage, perhaps as much as 20%,³ appear to be associated with true (macroscopically visible) urolithiasis. According to a study conducted at the Minnesota Urolith Center, struvite (magnesium ammonium phosphate) uroliths represented 78% of feline struvites in 1981. After more than two decades of decline, attributed to pet food manufacturer formulation changes, struvite prevalence began increasing again in the early 21st century. Recent Minnesota Urolith Center data estimate struvites comprise more than 48%⁴ of total feline uroliths making them, once again, the most common form of uroliths identified in cats. This trend that was also confirmed in an independent California study⁵ over a similar time period.

Most struvites in cats are, however, not associated with an underlying urinary tract infection. Diagnosis of sterile struvites do not appear to be definitively associated with any sex predisposition, but are more commonly seen in foreign shorthair, Ragdoll, Chartreux, Oriental shorthair, domestic shorthair and Himalayan breeds.⁶ Recent findings also indicate that struvite uroliths are more common than calcium oxalate in young adult cats under seven years of age.⁵ And although the role of magnesium remains unclear,⁶ alkaluria and low urine volume do appear associated with feline struvite development.⁷

Therapeutic Diets

Whenever viable, a therapeutic approach to struvite dissolution is a typical first step. A calculolytic diet, although not recommended for kittens, pregnant or lactating animals and those with hypertension, heart or renal failure, can be effective. Dissolution time varies, but generally falls in the range of 60-90 days. Continuation of the diet is also recommended for an additional 30 days beyond radiological confirmation of dissolution.

Calculolytic diets are not, however, considered a maintenance diet. Manufacturers, including Hill's Pet Nutrition, state that such diets should not be fed for more than six consecutive months. This approach is therefore not a viable option in the prevention of recurrence.

Although these diets do successfully dissolve struvites, compliance is a frequent challenge. Whether the result of the cat's refusal to eat, non-elimination of other food sources, or affordability, without strict adherence, dietary management will fail.

Therapeutic Nutrition – Methio-Form

An alternative approach to a restrictive calculolytic diet can be found in effective nutritional supplementation. Through the natural process of methionine metabolism, Methio-Form provides for continuous sulfuric acid excretion into the urine. With regular supplementation, this ensures a stable acidic environment, regardless of dietary consumption.

Because long-term Methio-Form supplementation is safe and inexpensive, it is an ideal approach to initiating medical dissolution therapy as well as ongoing nutritional support toward the prevention of struvite recurrence.

Canine Struvite Urocytolithiasis

Based on admissions data from 24 schools of veterinary medicine between 1980 and 1993, the Veterinary Medical Data Base (Purdue University) reported an incidence of lower urinary tract disease in 3% of dogs. The third most common diagnosis, urolithiasis, accounted for 18% of admissions.

Struvite remains one of the most common types of canine uroliths identified. Although the prevalence appears to have decreased slightly in recent years, nearly 40%⁸ of cases are associated with magnesium ammonium phosphate hexahydrate.

Infection-related struvites, most commonly found in dogs, typically involve urease-positive *Staphylococcus* species although urease-producing *Proteus* species and *Ureaplasma* organisms have also been implicated.⁹ It is the breakdown of urea by these organisms that result in ammonia release into the urine, and subsequently a higher predisposition to struvite formation.

Recent studies have shown that struvite uroliths occur at a higher incidence in females, dogs younger than 7 years of age¹⁰ with a breed predisposition toward Miniature Schnauzers, Shih Tzus, Bichon Frises, Miniature Poodles, Cocker Spaniels and Lhasa Apsos.⁹

Medical Dissolution – Antimicrobial Therapy and Therapeutic Diet

In addition to an appropriate antimicrobial regimen to treat the underlying infection, initial medical dissolution therapy typically includes a calculolytic diet. Although this approach has proven successful, the same compliance issues that exist for cat owners often challenge dog owners.

Here again, although they have been proven effective under ideal conditions, these calculolytic diets are contraindicated for certain medical conditions and cannot be utilized for long-term maintenance.

Evidence Based Therapeutic Nutrition – Methio-Form

Researchers at the University of Tennessee College of Veterinary Medicine evaluated the therapeutic viability of Methio-Form (DL-Methionine), along with an appropriate antimicrobial agent, in dissolving spontaneously occurring infection-induced struvite urocytoliths in dogs.¹¹

A total of 11 dogs were included in the study. The dogs were maintained on their regular diets and treated with both antimicrobial therapy and Methio-Form throughout the evaluation, including 2 weeks beyond radiological evidence of dissolution. Each dog was monitored by plasma biochemical analysis, urinalysis, urine culture, venous blood gas analysis and abdominal radiography every 4 weeks. Successful medical dissolution (reduction in urolith size by at least 50% at the 4 week re-evaluation) was achieved in 8 of the 11 dogs over a median 8 weeks of therapy (range: 4-12 weeks). In each case where therapy was ineffective, surgical removal and analysis revealed calcium oxalate urolith composition. No dogs lost weight, experienced metabolic acidosis or experienced any change in biochemical parameters throughout the course of study.

Based on their findings, Dr. Bartges and his colleagues at the University of Tennessee found the use of Methio-Form to be "...safe and effective in dissolving presumed infection-induced struvite uroliths in dogs in combination with an appropriate antimicrobial agent without using a struvite dissolution diet."¹¹ Moreover, the ability to utilize Methio-Form as a low-cost, preventative approach to maintaining urine acidification is a very appealing solution for owners.

About Methio-Form

Methio-Form is a highly palatable, chewable DL-methionine supplement for both cats and dogs. It is provided in dose-controlled, scored tablets for simple oral administration, according to size and acidification needs.*

Typical Dosage Guidelines

Cats:	2.5 -5.0 mEq/kg
All Breeds	1.5-3 tablets daily
Dogs:	2.0 – 4.0 mEq/kg
Small Breeds (< 7 kg)	0.5-4 tablets daily
Medium Breeds (7-15 kg)	2-7 tablets daily
Large Breeds (15-30 kg)	4-13 tablets daily

*Do not administer to acidotic animals or those with severe liver, kidney or pancreatic disease.

References

- Osborne CA, Kruger JM, Lulich JP, et al. Feline lower urinary tract disorders. In: Ettinger SJ, ed. *Textbook of veterinary internal medicine*, 7th ed. Philadelphia: WB Saunders Co, 2010; 2069-2086.
- AVMA website. Market research statistics. U.S. pet ownership-2007. Available at: <http://www.avma.org/reference/marketstats/ownership.asp>. Accessed Jan 20, 2011.
- Evidence Based Pet Forum website. Feline lower urinary tract disease-(FLUTD): Diet or drugs? Available at: <http://www.ebvet.com/forum/viewtopic.php?t=28#p29>. Accessed Jan 20, 2011.
- DVM360 website. Changing trends in composition of feline uroliths and urethral plugs. Available at: <http://veterinarynews.dvm360.com/dvm/Medicine/Changing-trends-in-composition-of-feline-uroliths-/ArticleStandard/Article/detail/322310>. Accessed Jan 20, 2011.
- Cannon AB, Westrop JL, Ruby AL, et al. Evaluation of trends in urolith composition in cats: 5,230 cases (1985-2004). *J Am Vet Med Assoc* 2007;231:570-576.
- DVM360 website. Stalking stones: An overview of canine and feline urolithiasis. Available at: <http://veterinary-medicine.dvm360.com/vetmed/Feline+Center/Stalking-stones-An-overview-of-canine-and-feline-u/ArticleStandard/Article/detail/557955>. Accessed: Jan 20, 2011.
- Chew DJ, Buffington, CA. Feline urolithiasis, in *Proceedings*. VCA Antech Semin Update on Nephro/Urol 2006; 51-60.
- DVM360 (DVM Newsmagazine) website. Perspectives: analysis of 275,000 uroliths. Available at: <http://veterinarynews.dvm360.com/dvm/article/articleDetail.jsp?id=360567&sk=&date=&pageID=2> Adams, LG, Syme HM. Accessed: Jan 20, 2011.
- Lulich JP, Osborne CA, Bartges JW, et al. Canine lower urinary tract diseases. In: Ettinger SJ, Feldman EC eds. *Textbook of veterinary internal medicine*. 6th ed. St. Louis: Elsevier Saunders, 2005; 1850-1874.
- Low WW, Uhl JM, Kass PH et al. Evaluation of trends in urolith composition and characteristics of dogs with urolithiasis: 25,499 cases (1985-2006). *J Am Vet Med Assoc* 2010;236:193-200.
- Bartges J, Moyers T. Evaluation of D, L-methionine and antimicrobial agents for medical dissolution of spontaneously occurring infection-induced struvite urocytoliths in dogs, in *Proceedings*. Am Coll Vet Intern Med Forum 2010:495.

Manufactured for



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