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Melamine and Cyanuric Acid-Induced Crystalluria, Uroliths, and Nephrotoxicity in Dogs and Cats 1

This article discusses the 2007 recall of canned pet food because of concerns about adverse effects on kidney function of cats and dogs. The discovery of melamine and cyanuric acid in the foods is detailed. Case studies, including clinical, pathology, histology, and toxicology findings, are presented. An attempt is being made to identify the minerals in the uroliths and kidney tissues of affected animals.

Changing Paradigms of Feline Idiopathic Cystitis 15
John M. Kruger, Carl A. Osborne, and Jody P. Lulich

Since 1996, when the authors assembled the existing body of knowledge about lower urinary tract disease in cats, the understanding of the biological behavior and pathologic features of naturally occurring feline idiopathic cystitis has increased. No single model explains all the biological variability observed in cats with idiopathic cystitis. The authors’ experience and available evidence indicate that feline idiopathic cystitis represents a syndrome resulting from a number of separate underlying but potentially interrelated mechanisms rather than a disease with a single cause. Identification of safe and effective treatment and prevention strategies of feline idiopathic cystitis will likely vary, depending on the underlying causes.
Changing Paradigms in the Frequency and Management of Canine Compound Uroliths
Lisa K. Ulrich, Carl A. Osborne, Amy Cokley, and Jody P. Lulich

This article discusses the composition, formation, and treatment of canine compound uroliths and the importance of recognizing the unique causal factors that may be present in each individual patient. After first giving a detailed analysis of what compound uroliths are and how they form, the authors give examples and data from canine uroliths submitted between 1981 and 2007. Finally, the article discusses the importance of this data when formulating management strategies for individual patients to either dissolve existing stones or minimize urolith recurrence.

Drug-Induced Urolithiasis
Carl A. Osborne, Jody P. Lulich, Laurie L. Swanson, and Hasan Albasan

The prevalence of uroliths that contain drugs, their metabolites, or toxic ingredients in dogs, cats, and other animals is unknown. The authors examine specific drugs and their use in the animal population. They discuss these drugs in terms of uroliths and urolith formation in a variety of animals, making recommendations on which drugs can be safely used based on evidence from the authors’ own studies and the literature.

Quantitative Analysis of 4468 Uroliths Retrieved from Farm Animals, Exotic Species, and Wildlife Submitted to the Minnesota Urolith Center: 1981 to 2007
Carl A. Osborne, Hasan Albasan, Jody P. Lulich, Eugene Nwaokorie, Lori A. Koehler, and Lisa K. Ulrich

Knowledge of the mineral composition of uroliths in various species of animals can help veterinarians predict the mineral composition of stones in vivo. This information is important because dissolution of existing uroliths, or minimizing further growth of uroliths in situ, is dependent on knowledge of the mineral composition of uroliths. With this objective in mind, this report summarizes the results of quantitative mineral analysis of uroliths retrieved from 4468 animals sent to the Minnesota Urolith Center. It also encompasses the most extensive database about uroliths from animals other than domesticated dogs and cats found in the literature.

Changing Paradigms in the Diagnosis of Urolithiasis
Jody P. Lulich and Carl A. Osborne

A paradigm shift is a fundamental change from a traditional model of thinking. This article presents four paradigm shifts in the diagnoses of urolithiasis, based on the experiences of the authors in the treatment of uroliths in
dogs and cats. Case examples are provided to illustrate points regarding urine storage, ultrasonography, use of radiography to assure complete removal of uroliths, and the frequency of upper tract uroliths in cats.

Changing Paradigms in Ethical Issues and Urolithiasis

Carl A. Osborne, Jody P. Lulich, James F. Wilson, and Carroll H. Weiss

This article defines the ethics involved in the medical treatment of patients. Using a case example, the authors discuss the treatment of uroliths from an ethical and medical perspective. Uroliths are defined, and treatment is discussed and explained.

Changing Paradigms in Diagnosis of Inherited Defects Associated with Urolithiasis

Danika Bannasch and Paula S. Henthorn

The way in which veterinary scientists think about and approach the study of genetic disease has not changed, but the tools available to veterinary scientists have and will continue to change, allowing us to study increasingly complex problems and to make more rapid advances in the context of simple problems. To put these advances in perspective, this article first gives a historical perspective on the approaches to studying genetic diseases, particularly in human beings, and then outlines the advances that have become possible with the availability of the dog genome sequence. The article then discusses two inherited defects that are associated with urolithiasis, in particular, those responsible for cystine and purine (uric acid and its salts) stone formation. Together, these two conditions illustrate the contemporary use of a broad range of genetic approaches.

Paradigm Changes in the Role of Nutrition for the Management of Canine and Feline Urolithiasis

Carl A. Osborne, Jody P. Lulich, Dru Forrester, and Hasan Albasan

Results of experimental and clinical investigation have confirmed the importance of dietary modifications in medical protocols designed to promote dissolution and prevention of uroliths. The objectives of medical management of uroliths are to arrest further growth and to promote urolith dissolution by correcting or controlling underlying abnormalities. For therapy to be most effective, it must promote undersaturation of urine with lithogenic crystalloids by 1) increasing the urine solubility of crystalloids, 2) increasing the volume of urine in which crystalloids are dissolved or suspended, and 3) reducing the quantities of lithogenic crystalloids in urine. This article summarizes and applies evidence about nutritional management of urolithiasis derived from experimental and clinical studies of cats and dogs performed at the Minnesota Urolith Center.
Changing Paradigms in the Treatment of Uroliths by Lithotripsy

Jody P. Lulich, Larry G. Adams, David Grant, Hasan Albasan, and Carl A. Osborne

Surgery remains a common procedure for removal of uroliths from the lower urinary tract of dogs. Incorporation of intracorporeal laser lithotripsy and extracorporeal shock wave lithotripsy has provided impetus for a paradigm shift in the way veterinarians manage urinary stones, however. These minimally invasive techniques provide a successful alternative to surgical urolith extraction.

Canine Uroliths: Frequently Asked Questions and Their Answers

Lori A. Koehler, Carl A. Osborne, Michelle T. Buettner, Jody P. Lulich, and Rosalie Behnke

This article is devoted to answering frequently asked questions from veterinarians, veterinary technicians, and pet owners about urolithiasis and the detection, treatment, and prevention of various types of uroliths from various locations in the urinary tract. It has been divided into the following topics: urolith analysis, urolith types, diagnosis, treatment and prevention, urolith recurrence, urinalysis, diet, water, and miscellaneous. The information is geared toward both professionals (eg, the chemical analysis of uroliths) and pet owners (eg, the practical considerations of diet). It includes photographs of various stones and a checklist of factors that suggest the probable mineral composition of canine uroliths.

Analysis of 451,891 Canine Uroliths, Feline Uroliths, and Feline Urethral Plugs from 1981 to 2007: Perspectives from the Minnesota Urolith Center

Carl A. Osborne, Jody P. Luclich, John M. Kruger, Lisa K. Ulrich, and Lori A. Koehler

Urolithiasis is a general term referring to the causes and effects of stones anywhere in the urinary tract. Urolithiasis should not be viewed conceptually as a single disease with a single cause, but rather as a sequela of multiple interacting underlying abnormalities. Thus, the syndrome of urolithiasis may be defined as the occurrence of familial, congenital, or acquired pathophysiologic factors that, in combination, progressively increase the risk of precipitation of excretory metabolites in urine to form stones (ie, uroliths). The following epidemiologic discussion is based on quantitative analysis of 350,803 canine uroliths, 94,778 feline uroliths, and 6310 feline urethral plugs submitted to the Minnesota Urolith Center from 1981 to 2007.