Letters to the Editor

Effects of diet on lower urinary tract signs in cats with nonobstructive idiopathic cystitis

Kruger et al[1] recently published a study of the effects of two diets on recurrence of lower urinary tract signs (LUTS) in cats with nonobstructive idiopathic cystitis (IC). Their study compared a custom-formulated control diet (14 cats) to a diet designed for struvite prevention and dissolution (11 cats),[2] even though IC and urolithiasis are categorically different disease processes.[3] No statistically or clinically significant effect of either diet was found on the primary outcome variable, the number of recurrent episodes of LUTS (except for a significant [P = 0.04] difference in the number of episodes of stranguria, but the P value was not adjusted for the multiple comparisons performed). Although significant differences in incidence rate (episodes/1,000 cat-days) of multiple signs, hematuria, and stranguria were identified, these differences likely occurred because two cats fed the control diet had many more recurrent episodes of multiple-sign days (13 and 16) than did the remaining cats fed the control diet (≤ 5 recurrent episodes each), making them statistical outliers.

Even if differences had been found, the study was not designed to determine which diet was associated with a higher or lower likelihood of recurrence of LUTS in cats with IC. This is important because the incidence rate for cats fed the test diet in this study was comparable to that found in a previous study[4] and to rates reported in most other studies (including ours) referenced in the report that did not involve use of a therapeutic diet. This suggests that the custom-manufactured control diet used by Kruger et al might have been deleterious in some way, rather than that the test diet was beneficial.

As the authors recognized, external factors may initiate LUTS, in both healthy cats and cats with IC. That the study found no difference in prevalence of other external factors further supports the speculation that cats fed the control diet had more episodes of LUTS than expected, rather than the cats fed the test diet having fewer. Unfortunately, neither of the diets is commercially available, so this possibility is not testable.

To evaluate the number of episodes, one might have compared LUTS before and after introduction of the diets to determine whether either diet affected the number of cats with LUTS. Assuming that data in Tables 1 and 2 are comparable, use of the Fisher exact test suggests that there was no significant change in the number of cats affected by any LUTS after provision of either diet (all P values ≥ 0.2). The study's findings thus add weight to the presently available evidence that nutrient effects (including wet versus dry forms) on LUTS in cats with IC, if any, are small.

We agree with the authors' conclusion that "the present study is limited in that its design precludes meaningful assessment of the role of food formulation (wet vs dry) on recurrence of FIC or the effect of nutrition on cats with chronic forms of the disease," and extend it to the rest of the comparisons between food formulations. The chance that provision of the control diet could have resulted in an increase in LUTS suggests that hedonic or feeding-related factors other than nutrient content may be worthy of investigation in cats with IC.

Tony Buffington, DVM, PhD
Emeritus Professor of Veterinary Clinical Sciences
College of Veterinary Medicine
The Ohio State University
Woodland, Calif

Dennis Chew, DVM
Professor Emeritus
Center for Veterinary Medicine
Department of Veterinary Clinical Sciences
College of Veterinary Medicine
The Ohio State University
Columbus, Ohio

1. Kruger JM, Lulich JP, MacLeay J, et al. Comparison of foods with differing nutritional profiles for long-term management of acute nonobstructive idiopathic cystitis in cats. *J Am Vet Med Assoc* 2015;247:508–517.
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3. Kruger JM, Osborne CA, Lulich JP. Changing paradigms of feline idiopathic cystitis. *Vet Clin North Am Small Anim Pract* 2009;39:15–40.
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The authors respond:

We thank Drs. Buffington and Chew for their interest in our

Instructions for Writing a Letter to the Editor

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recent article comparing two foods for long-term management of acute nonobstructive idiopathic cystitis (IC) in cats.[1] Proportional outcome (percentage affected) has traditionally been used as the principal variable to assess therapeutic efficacy of agents advocated for management of IC. However, in our study, the primary outcome variable was incidence rate, which measures the frequency of new episodes over time in the study population. Compared with a simple proportion, incidence rate has the advantage of allowing assessment of multiple recurrent events in a population of cats observed for various lengths of time. Previous observations indicate that multiple recurrences in the same individual are a common feature of IC,[2–4] and our study was designed to incorporate this important, but often underappreciated, dimension of this disease. We emphasize that these two types of observations (proportion and incidence rate) are not mutually exclusive but complementary. We acknowledge that proportions of cats experiencing recurrences were not significantly different between groups in our study. However, there were significant differences in incidence rates for recurrent episodes of multiple-sign days and episodes of hematuria, dysuria, and stranguria between food groups. We believe that our study population was appropriate and representative of the range of normal biological variation reported by others. In a previous clinical trial of 40 cats,[3] mean and median number of recurrences per affected cat were 5 and 2.5 episodes (range, 1 to 19 episodes), respectively, over a period of only 6 months. In our control group, mean and median number of recurrences per affected cat were 5.2 and 3 episodes (range, 1 to 16 episodes), respectively, over 12 months.

In our study, we compared a widely available commercial multipurpose urinary therapeutic food and a custom manufactured control food designed to mimic common feline maintenance foods. Drs. Buffington and Chew pose an interesting question as to whether the significant differences between groups were due to the beneficial effects of the cystitis-prevention food or, conversely, detrimental effects of the control food. We are unaware of any previous controlled studies specifically designed to evaluate incident rate of recurrent episodes of IC. While it is tempting to compare our observations to findings of a previous study[4] in which the overall incidence rate was substantially higher than the rate for cats fed the test food in our study[1] (2.6 episodes/1,000 days vs 0.7 multiple-sign episodes/1,000 days), we emphasize that these studies were not comparable in that a variety of therapeutic and nontherapeutic maintenance foods were fed during a longer 2-year follow-up period in the earlier study. Regardless, the fact remains that the test and control foods in our study were associated with significantly different incidence rates, supporting our conclusion that foods with differing nutritional characteristics have an effect on expression of IC-associated signs. As with all scientific endeavors, our observations must always be subject to verification. We look forward to future randomized controlled clinical studies investigating the role of nutrition in the expression of IC.

John M. Kruger, DVM, PhD
Jane Merrills, DVM
Department of Small Animal Clinical Sciences
College of Veterinary Medicine
Michigan State University
East Lansing, Mich

Jody P. Lulich, DVM, PhD
Carl A. Osborne, DVM, PhD
Department of Veterinary Clinical Sciences
College of Veterinary Medicine
University of Minnesota
Saint Paul, Minn

Jennifer MacLeay, DVM, PhD
Inke Paetau-Robinson, PhD
Hill's Pet Nutrition Center
Hill's Pet Nutrition Inc
Topeka, Kan

John Brejda, PhD
Alpha Statistical Consulting Inc
Lincoln, Neb

1. Kruger JM, Lulich JP, MacLeay J, et al. Comparison of foods with differing nutritional profiles for long-term management of acute nonobstructive idiopathic cystitis in cats. *J Am Vet Med Assoc* 2015;247:508–517.
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Importance of using existing resources for managing wild horse and burro populations

Although adoption rates for wild horses and burros may be in decline, I still believe the public regards these animals as part of our country's national heritage and an important part of Western culture. Identifying effective contraceptive management programs is a topic of national-level interest, so I was grateful to see the recent *JAVMA* News story[1] on the Bureau of Land Management's research efforts into ways to maintain wild horse and burro populations at manageable levels.

Given that porcine zona pellucida (PZP) vaccines have been shown to be an effective means of reducing fertility, I was surprised to read that only 384 animals had been vaccinated with a PZP vaccine in 2014 and that a study designed to develop an enhanced PZP vaccine that could last several years has not yet been funded. In my opinion, PZP vaccines likely represent the best tool to control wild horse and burro populations; therefore, it was discouraging to find that they are apparently underutilized and understudied.

Safe and humane contraception is, to my mind, the only effective approach to managing wild horse and burro populations. We should continue to allocate resources to research that advances that goal. However, we should also commit to implementation of those tools already shown to be effective, including PZP vaccines.

Dickie J. Vest, DVM
Cleveland Amory Black Beauty Ranch
Murchison, Tex

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Shedding light on rabies in opossums

Public health and veterinary professionals have commonly taken the stance that Virginia opossums (*Didelphis virginiana*), marsupials found throughout North America, cannot get rabies.[1,2] This misconception could result in failure to conduct a risk assessment following encounters with opossums, with potentially fatal consequences. Two reasons for this misconception have been proposed: that the body temperature of opossums (34.4° to 36.1°C [94° to 97°F]) is too low to harbor the virus, and that opossums are unlikely to survive an attack from a rabid animal long enough to become infected.[3]

Although more typical rabies reservoirs (eg, raccoons and bats) pose a higher risk, opossums can become infected with rabies virus and should be recognized as a possible source of exposure to animals and humans. The published literature on rabies in opossums is scarce. In a study[4] published in 1966, two opossums were inoculated IM with rabies virus of red bat (*Lasiurus borealis*) origin, and no clinical signs or antibodies developed. In 1960, Beamer et al[5] tested the susceptibility of opossums to rabies by directly inoculating, either intracerebrally or IM, 34 wild-trapped opossums with rabies virus (fox, skunk, or standard challenge virus). Four (12%) animals developed CNS signs, and a transmissible agent that was subsequently lethal to mice was recovered from one. The authors concluded on the basis of their results that "the opossum is highly resistant to rabies," and this conclusion has subsequently influenced our understanding of rabies in opossums.

Between 1984 and 2014, the Maryland Department of Health and Mental Hygiene documented 12 cases of rabies in opossums by means of direct fluorescent antibody testing. The rabies strain infecting these opossums was not determined but likely was the raccoon strain enzootic to the Mid-Atlantic States. To our knowledge, there is no published literature on the pathogenesis or clinical manifestations of raccoon rabies virus in opossums.

In one Maryland case, an opossum was observed banging its head against a wall, growling, and acting aggressively, and the public health report indicated that the animal was "acting rabid." While it was easy to recognize abnormal behavior in this instance, in other cases, the opossums did not have such obvious signs of rabies. In one recent case, the animal reportedly "appeared ill." Another rabid opossum was found dead, and one other was described as behaving normally.

Given the present epidemiologic data, it seems clear that opossums do not present the greatest risk of rabies; however, it should be recognized that they do pose some risk. While the number of rabid opossums is likely low, they still serve as a potential source of rabies exposure. Review of an online veterinary forum[2] revealed numerous descriptions of opossum encounters following which the animal was not tested for rabies because the persons involved believed opossums could not contract rabies. Given that rabies is virtually always fatal in people after the onset of clinical signs, dismissing an exposure to an opossum could result in the loss of human life. Such exposures should be appropriately assessed for risk, as is recommended for rabies reservoir species and other mammals.

Noelle K. Diana, BS
College of Veterinary Medicine
The Ohio State University
Columbus, Ohio

Kimberly C. Mitchell, PhD
Katherine A. Feldman, DVM
Center for Zoonotic and Vector-borne Diseases
Maryland Department of Health and Mental Hygiene
Baltimore, Md

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