SPECIAL FOCUS

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Urinary issues are a common reason pet owners bring their cats in for non-routine visits. Accurately reading the lower urinary tract signs is imperative to treatment and diagnosis.
The year 2019 continued NAVTA’s transition which began in 2018 as NAVTA grows into the strong association we all know it can be and want it to be; a year in transition. The AVMA provided “back-end” management and administrative services for NAVTA for the majority of the year. This temporary arrangement lessened the need for NAVTA volunteer leaders to be involved in the day-to-day operations of the association and provided the Board ample time to conduct a search for a full-time staffing solution. I would like to publicly acknowledge and thank the AVMA, in particular, Adrian Hochstadt, Deputy Chief Executive Officer, Office of the Executive Vice President; and Brenda Streeter, Staff Assistant, Office of the Executive Vice President, for their commitment to NAVTA and for providing outstanding service to the association and our members.

The Board finalized an agreement with Professional Management Associates, LLC (PMA) to provide full-time staffing solutions for NAVTA starting in November. PMA is a full-service association management company providing not only the administrative backbone NAVTA needs, but also the professional services required of a growing association, including: membership recruitment and retention services; leadership and strategic planning support; education and meeting management; accounting services; organization and industry partnership development; and marketing, digital, and communications support.

To lead PMA’s efforts with NAVTA, Phillip E. Russo, CAE, came onboard as Executive Director. Phil works closely with the NAVTA Board to identify, attain, sustain, and grow success in all areas. His areas of expertise include strategic and operational planning; innovative non-dues revenue programs; communications, public relations, and publications; conference and tradeshow strategy and execution; and market research and benchmarking. Phil is a not-for-profit association veteran of more than 25 years and for more than 22 consecutive years has maintained his credential as a Certified Associate Executive, attesting to his expertise in running non-profit organizations.

The need for professional management of the association and the hiring of an experienced Executive Director are the first steps to set up the foundation for growth for NAVTA! I would be remiss, however, if I did not thank my fellow Board members for all their hard work in keeping NAVTA moving forward and helping implement these critical foundational building blocks.
The 2019 Board members were:
• Erin Spencer – President
• Ken Yagi - President Elect
• Jamie Rauscher – Secretary
• Michelle Krasicki-Aune - Treasurer
• Kara Burns - Immediate Past President
• Harold Davis – Member-at-Large
• Heather Hopkinson - Member-at-Large

Not Standing Still
Simultaneous with the transition to a new management team, the NAVTA Board kept the association moving forward in several specific areas:
• Providing continuing education opportunities throughout the year at numerous industry conferences
• Providing free continuing education webinars
• Representing the association at industry events
• Developing and strengthening industry partnerships
• Being the driving force behind the Veterinary Nurse Initiative (VNI) (see separate report on this)
• Supporting credentialing criteria for specialty academies
• Fostering a leadership network and representation around the nation
• Conducting a member survey to gather input to make informed decisions on what members want, need, and find valuable.

I would also like to thank our numerous volunteers who participated in committees, task forces, and state and district groups, who led NAVTA’s initiatives throughout the year. These are some of the hardest working individuals in the profession and NAVTA owes them a great debt of gratitude for their commitment to the association and profession. In particular, please join me in thanking the Chairs of our national committees:
• Mary Berg – State Representative Committee
• Tammy Ege – Student Chapter of NAVTA (SCNAVTA) Committee Co-Chair
• Dennis Lopez – Approved Veterinary Assistant (AVA) Committee
• Linda Markland – Global Outreach Committee
• Linda Merill – Committee on Veterinary Technician Specialties (CVTS) Chair
• Vicky Ograin - Education Committee
• Heather Prendergast – VNI Co-Chair
• Barbara Robinson – SCNAVTA Co-Chair
• Rebecca Rose – Wellbeing Task Force Co-Chair
• Mark Sharpless - Legal Committee
• Beth Skiles – Membership Committee
• Jade Velasquez – Public Relations Committee

With our new staff team and an energized Board, NAVTA is ready to run: a year of steadfast motion. Two of our highest priorities will be to refresh our strategic plan and then take a critical look at all of our programs to ensure they align with that plan. All of us envision a growing, prosperous association and it will be critical to map out a plan we can stick to for the near future.

I know I speak for the entire NAVTA Board when I express my excitement and eagerness for the new year and the future for NAVTA. These are, indeed, exciting times to be part of the veterinary technician profession – and part of the NAVTA family. If you are not already actively engaged with NAVTA, I strongly encourage you to find a way to get involved. It will be the most rewarding aspect of your career, to become the change we want to see.

—Ken Yagi, MS, RVT, VTS (ECC, SAIM)
NAVTA 2020 President

NAVTA's 2019 Executive Board

President
Kenichiro Yagi, MS, RVT, VTS (ECC), VTS (SAIM)

Over his 19 years in practice, Ken has discovered and refined his role as a veterinary technician by promoting compassionate and progressive care for patients and their families. He obtained his VTS certification in emergency and critical care as well as small animal internal medicine and achieved his master’s degree in Veterinary Science. He served as the ICU Manager and Blood Bank Manager at Adobe Animal Hospital until 2018, and now is the Program Director for the RECOVER CPR Initiative and the Veterinary Education Simulation Lab Manager at the Park Veterinary Innovation Laboratory at the Cornell University. Ken has co-edited the Manual of Veterinary Transfusion Medicine and Blood Banking and has published various text chapters and articles in various publications. He gives presentations internationally on topics in ECC, transfusion medicine, and the veterinary nursing profession.

Ken works to encourage further recognition of the vital role of veterinary nurses and technicians through work with organizations such as the National Association of Veterinary Technicians in America, co-chairing the Veterinary Nurse Initiative and serving as a board member of the Veterinary Emergency and Critical Care Society, the Academy of Veterinary Emergency and Critical Care Technicians and Nurses, and the Veterinary Innovation Council. He pursues these goals by showing the value of the profession’s perspective in veterinary medicine.

Ken invites everyone to ask “Why?” to understand the “What” and “How” of our field, and to constantly pursue new limits as veterinary professionals and individuals.
President Elect
Ed Carlson, CVT, VTS (Nutrition)

Ed Carlson grew up in New Hampshire and lived there much of his adult life working in rural primary care practices. He moved to Massachusetts and joined the IVG Hospitals (a founding member of Ethos Veterinary Health) in 2001. Ed has held multiple positions including veterinary technician in Internal Medicine, Emergency Critical Care, and General Practice, Technician Supervisor, Head Technician and Hospital Manager, Technician Learning and Development Specialist, Technician Learning and Development Manager for Ethos Veterinary Health – Ethos East Region before his current position as the Director of Technician Learning and Development for Ethos Veterinary Health and VetBloom.

Ed began his active involvement with NAVTA in 2013 after attending an annual NAVTA meeting at NAVC (now VMX) when he suggested that NAVTA hold Technician Case Reports. He co-chaired the first case reports in 2014 and has been organizing them ever since. In addition to serving as a Member at Large of the NAVTA Executive Board (2015-2017) he has served on multiple NAVTA committees including the State Representative Committee, Credentialing Task Force, VNI Working Group, Region 1 District Rep, AVMA Technician Utilization Task Force, Chair of the Committee on Veterinary Technician Specialties (CVTS) and Co-chair of the CVTS Guidelines Ad Hoc Committee.

Ed has served on the Executive Board of the Massachusetts Veterinary Technician Association since 2013 as Treasurer, Vice President, and the 2020 President. He served as the New Hampshire Veterinary Technician Association NAVTA State Rep and since 2016 as the Treasurer. Ed is also the Treasurer of the Academy of Veterinary Nutrition Technicians, a member Association of Veterinary Technician Educators and the Connecticut Veterinary Technician Association.

He obtained a VTS (Nutrition) in 2014 and lectures frequently at local, regional, and national veterinary conferences on a variety of nutrition topics. Ed was also the recipient of the NAVTA 2019 Technician of the Year award.

Immediate Past President
Erin A. Spencer, M.Ed., CVT, VTS (ECC)

Erin Spencer currently lives in New Hampshire and works in Massachusetts. The majority of her career has been spent working in Emergency and Critical Care and she still picks up relief shifts whenever she can. She earned her VTS (ECC) in 2011. After spending time as the technician manager for IVG Hospitals, Inc. (now Ethos Veterinary Health), Erin transitioned to the non-profit world and worked with the HSVMA Rural Area Veterinary Services (RAVS) teaching program as both a field technician and the volunteer coordinator. It was then Erin realized that she wanted to pursue teaching. While she continues to spend her summers with RAVS, she earned her M.Ed. in 2015 from Colorado State University and began teaching full-time at Mount Ida College the same year.

Erin currently works as an Assistant Professor in the Veterinary Technology program where she teaches a variety of courses, her favorite being a clinical skills lab where she is able to work one-on-one with students to develop their nursing skills. Erin lectures both regionally and nationally and is currently working on a book focusing on neonatal and pediatric nursing care. Erin has served on the board of the Massachusetts Veterinary Technician Association for a number of years and is the immediate past president of the organization. She also serves on the NAVTA Approved Veterinary Assistant Committee, as well as the Credentials and Mentoring Committee for the Academy of Veterinary Emergency and Critical Care Technicians (AVECCT).

She enjoys spending her down time with her husband and their furry little monster, a terrier cross, Nick.
Secretary
Jamie Rauscher, RVT

Jamie Rauscher is a Registered Veterinary Technician living in Atlanta, Georgia. She is the medical manager of a nine doctor GP/Emergency practice, where she has worked for 20 years. She is the current president of the Georgia Veterinary Technician and Assistant Association, as well as actively serving on several NAVTA committees. Jamie is in the process of pursuing the appointment of the Registered Veterinary Technician seat on the Georgia State Board of Veterinary Medicine. Jamie’s interests include anesthesia, surgery and pain management, as well as emergency & critical care. She also enjoys client communication and education. Jamie mentors the technicians and assistants that she comes into contact with on a daily basis. Last year she started a local continuing education group in Atlanta, which allows the technicians and assistants in the area to come together for food, networking and CE. She is also in process of pursuing her VTS in Emergency & Critical Care. In addition, Jamie is working on writing articles for publications and speaking engagements. She has had the opportunity to speak at several national conferences and will continue to do so next year. Jamie has been married for 15 years and has a teenage son. Her family also includes a golden retriever and three cats, one of them being a super cute sphynx kitten named Pitou.

Treasurer
Michelle D. Krasicki-Aune, MBA, BS, CVT

Michelle’s calling to work in veterinary medicine was evident from a young age. After becoming an on-the-job trained assistant at a large Chicagoland veterinary hospital, Michelle continued her education focusing on the sciences and graduating from North Dakota State University with a Bachelor’s of Science in Veterinary Technology, and she received her credentials as a Certified Veterinary Technician from the state of Minnesota. She furthered her education and received her Masters of Business Administration with an emphasis in Veterinary Medicine Management. During this time, she worked in a variety of small and mixed animal hospitals, veterinary teaching hospitals, specialty and referral hospitals, as well as serving as a veterinary technology educator for over eight years.

During her career, Michelle has served several terms on the Executive Board of the Minnesota Association of Veterinary Technicians, provided technical editing and question creation for upcoming textbooks, and contributed various articles to veterinary technology centered publications. When asked, she always finds time to contribute to both regional and national conferences such as AVMA, AAHA, MVMA, CVMA and ISVMA, in addition to participating in the Fear Free Speakers Bureau.

Currently Michelle spends her time volunteering on various NAVTA committees, NEPRIS, and owning and operating Vet Teams, LLC, where she provides veterinary technology relief, assessment, training and management services for various companion animal and specialty practices. She shares her home with her loving husband Zac, daughter Madelyn, and a small collection of furry friends.
Members at Large
Harold Davis, Jr., RVT, VTS (ECC) (Anesth/Analgesia)

Harold Davis is a Registered Veterinary Technician who grandfathered in to take the California Animal Health Technician Examination. He was also certified in Florida as a Veterinary Technician. He is a graduate of California State University, Sacramento with a Bachelor of Arts degree in Biology. Harold has been in the profession for 44 years and was drawn to the profession because of a love of animals and an interest in medicine. Harold has worked in a full-service veterinary clinic at a local humane society, general daytime practice, private emergency practice, and until July 2018 was the Manager of the Emergency and Critical Care Service at the UC Davis William R. Pritchard Veterinary Medical Teaching Hospital. He worked at UC Davis for nearly 36 years. Prior to managing the UC Davis Emergency Service, Harold was an ICU technician, coordinator and instructor in clinical practice for all first through third year veterinary students, and he was the Emergency Service supervisor. Currently he is a veterinary practice educational consultant/lecturer providing in-hospital continuing education opportunities.

As co-founder of the Academy of Veterinary Emergency and Critical Care Technicians, Harold was instrumental in working with, and obtaining from, the North American Veterinary Technicians Association (now known as the National Association of Veterinary Technicians in America) provisional recognition for technicians as specialists. This was the first organization to receive this acceptance. He is also a charter member of the Academy of Veterinary Technicians in Anesthesia and Analgesia. Harold is a former member-at-large to the Board of Directors for the Veterinary Emergency and Critical Care Society (VECCS), having also served as treasurer and president. Harold is the first non-veterinarian elected as president of this 5,000 plus member organization. He is a member of the Board of Directors for the North American Veterinary Community (NAVC) where he is completing his term as Vice President and will become the President-elect in 2020. As a member of the NAVC Board Harold is the Chairmen of the Earl Rippie Veterinary Technician Scholarship committee and member of the Executive, Board Review, Officer Nominating and VMX Program Committees. Harold has served on several continuing education program committees for various organizations such as AAHA, ACVIM, VECCS, and UC Davis. In 1985 Harold was appointed by California Governor, George Deukmejian, to serve on the Registered Veterinary Technician Examining Committee a subcommittee of the Veterinary Medical Board. Harold is the recipient of many awards and honors. He is a national and international speaker having spoken in eleven countries. Harold has published several book chapters, journal articles and co-edited a book entitled Advanced Monitoring and Procedures for Small Animal Emergency and Critical Care.

Courtney Waxman, CVT, RVT, VTS (ECC)

Courtney is originally from Phoenix, Arizona and has spent over 10 years working in emergency and critical care private practice. She obtained her VTS (ECC) in 2017 and has previously served in supervisory and training positions. Her areas of special interest include CPR, mechanical ventilation, one-on-one case management, critical care nursing, critical thinking, and technician training. In 2018, Courtney relocated to West Lafayette, Indiana to pursue a teaching position with Purdue University’s Veterinary Nursing Program. Transitioning to academia has allowed her to combine her passions of veterinary nursing and teaching with the next generation of veterinary and veterinary technician/nursing students. In order to stay current, she regularly picks up shifts in the Veterinary Teaching Hospital’s ICU department. She is in the process of completing her Master of Science in Higher Education – College Teaching degree.

In addition to serving on the NAVTA Board, Courtney also serves as the President of the Indiana Veterinary Technician Association (IVTA), on the Veterinary Nurse Initiative advisory team, on the Recertification Committee for the Academy of Veterinary Emergency and Critical Care Technicians and Nurses (AVECCTN), and is a RECOVER Certified BLS and ALS Instructor. She also enjoys sharing her passion for emergency and critical care by lecturing regionally, nationally and internationally, and has been published in veterinary technician/nursing journals in the US, UK, and Canada. In 2019, Courtney was awarded New Educator of the Year by the Association of Veterinary Technician Educators (AVTE).

Outside of veterinary medicine, she enjoys world travel with her husband, spoiling her fur kids, reading, and fitness.
As a NAVTA member you'll receive:

- Representation of your voice with national organizations like the AVMA and AAVSB.
- Advocacy for our profession in national and state legislation.
- Receive NAVTA Journal and Enewsletters
- Access to the NAVTA CE Portal and CE modules
- Robust Career Center and resources
- 20% membership discount if you are a specialist or member of your state association
- 10% discount on VetMedTeam.com courses
- 10% off Puppy Start Right for Instructors Course, hosted by the Karen Pryor Academy
- 20% discount on Vetlexicon, the worlds largest online clinical reference source, provided by Vetstream. In addition, NAVTA members can receive a free, 30 day trial!
- 20% off FearFree Certification
- Discounts on movie tickets, theme parks, hotels, tours, Broadway and Las Vegas shows!
- Discounts with Embrace Pet Insurance
- 10% discount on all online purchases at www.scrubidentity.com
- Complimentary membership with VetCheck—the amazingly simple veterinary communications software!
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- 25% discount and free shipping on Elsevier titles
- 15% discount for I Love Veterinary Medicine merchandise

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Veterinary Nurse Initiative (VNI) 2019 Update

VNI GOALS

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<td>Promoting a standard credential with educational standards in the US</td>
<td>Establishing professional identity through public education and title recognition to contribute to public safety/protection.</td>
<td>Clarifying the value, scope of practice, and title, delineating the credentialed veterinary technician/nurse role.</td>
<td>Defining the role of our profession in all areas of practice to maximize potentials.</td>
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The Veterinary Nurse Initiative (VNI) worked through 2019 to pursue our main goals of standardizing professional credentials, elevating public and professional recognition, and expanding career potential for our profession around the nation. We aim to unite our profession under one national title having standardized credential requirements, established title protection, and a defined standard scope of practice under the title of Registered Veterinary Nurse (RVN).

Credentialing standards of today include graduation from an AVMA-accredited veterinary technology program and passing the VTNE for initial credentialing, followed by continuing education requirements to maintain the credential. The VNI supported efforts in establishing said standards through supportive statements and providing resources to various state entities. Bills directly introduced by the VNI focused on states that can create the RVN model that meets these standards. The VNI, through NAVTA, also successfully fought against legislative proposals that would have established credentialing pathways that removed the educational requirements.

The general public does not currently understand the role, level of education, scope of practice, and credentials of our profession within the veterinary team, and many times are unaware that there are more than veterinarians that care for their pets. The VNI is raising awareness to an accurate picture of our profession through videos such as #PetsNeedNursesToo and featuring thoughts by members of our profession through the VNI Voice. Bills have been introduced in a few states to establish the RVN title, and it remains a goal going into 2020 to establish this title in an initial group of states. Officially establishing the title will allow an immediate understanding by the public of the existence of a veterinary team member focused on nursing care. Other means of elevating the profession in the public’s eyes will continue to be explored.

Improvement in professional recognition was pursued by encouraging credentialed members of our profession being referred to by the appropriate title, and the appropriate scope of practice being properly applied in practice, distinguishing credentialed individuals from those that are not credentialed. The VNI established a title protection task force evaluating the current state of title protection in the nation, raising awareness of the issues, and developing tools to better enforce title protection regulation. The VNI supports advocates for better title protection around the nation. The VNI also presented challenges and solutions to elevate professional recognition and utilization of our profession at the Pet Healthcare Industry Summit, and has also held VNI informational sessions and summits in various regions.

The VNI believes there is a strong need to expand career potential of our profession. Raising awareness of the education, skillsets, and roles as critical thinkers in the veterinary team and promoting better utilization in practice as it is possible today, in addition to expanding our role into the profession of the future, is vital to continued growth. The VNI and NAVTA have been working with the AAVSB to establish a better-defined scope of practice by participating in the work towards establishing a model regulatory language for veterinary technician scope of practice. We continue to paint the picture of the role of a fully utilized member of our profession in our outreach.

A recount of the avenues to reach consensus and surveys that have been performed with the veterinary technician community shows a strong trend of support, with most recent surveys showing 82-94% of respondents being in favor of the title change to RVN. Over 40+ organizations have now issued financial or statements of support for the VNI. At this point in time, at least five veterinary technology programs have changed to Veterinary Nursing programs and are offering degrees in veterinary nursing. We are seeing signs that the Veterinary Nurse Initiative has incited deeper discussions regarding our profession and the attention needed to set the profession up for success, for our future generations.

The amount of support has grown since discussions regarding challenges in our profession has been placed out in the open, and the VNI will continue to monitor our constituent’s opinions through future summits, open discussions, and surveys. The Veterinary Nurse Initiative will continue to function as an avenue for NAVTA to lead change in our profession through research, communication, and advocacy for the national credential process by addressing relevant questions and providing information for the veterinary community.
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LEARNING OBJECTIVE:
Readers should gain an understanding of the risk factors, causes, pathophysiology of and treatment of feline idiopathic cystitis and its association with stress in cats.

This program was reviewed and approved by the AAVSB RACE program for 1 hour of continuing education in jurisdictions which recognize AAVSB RACE approval. Please contact the AAVSB RACE program if you have any comments/concerns regarding this program’s validity or relevancy to the veterinary profession.
**Introduction**

According to the 2017-2018 edition of the AVMA Pet Ownership and Demographics Sourcebook, the population of pet cats in the United States at the time of the survey was 58.4 million. That’s a lot of cats, and this figure may not account for the many outdoor cats who aren’t considered truly “owned,” but may still be fed or cared for by one or more human households. Despite this popularity, only 47.2 percent of cat owners reported bringing their cat to the veterinarian for annual routine or preventive care, compared to 78.8 percent of dog owners. Potential factors for the relative lack of preventive veterinary care for cats include perception of economic value of a wellness visit, the ability of cats to hide early outward manifestations of illness, and the stress for both owner and cat of taking a trip to the veterinary clinic. The first two factors can be addressed through continued client education and clinic marketing efforts. Addressing feline stress, however, requires in-depth knowledge of feline behavior and welfare, and is crucial to successful (and therefore likely more frequent) veterinary visits as well as overall health at home. Feline stress is a risk factor for the second most common reason that cat owners ultimately do bring their cat to the veterinary clinic—lower urinary tract signs—according to data from Nationwide pet insurance. So not only is stress a reason that cat owners don’t bring their cat to the vet for preventive visits, it is heavily associated with one of the primary reasons they bring them in for non-routine visits.

Lower urinary tract signs (LUTS), while sometimes lumped together as a single common presenting complaint, really encompasses several different clinical signs and disease processes that affect the urinary bladder and/or urethra. These signs can include hematuria (blood in the urine), stranguria (straining to urinate), pollakiuria (urinating small, frequent amounts), dysuria (difficulty urinating), and periuria (urinating outside of regular, accepted locations). The various causes of LUTS can result in one or more of these clinical signs, making it difficult to diagnose a specific cause based on clinical signs alone. It is important to distinguish between the specific causes of LUTS, though, as they may be managed differently. Lower urinary tract signs may be caused by uroliths (stones) in the bladder or urethra, urinary tract bacterial infection, neoplasia, urethral plugs, incontinence, behavioral causes, anatomical abnormalities, and feline idiopathic cystitis (FIC). It is also important to rule out involvement of the upper urinary tract, notably the kidneys and ureters.

**Diagnosing Patients with LUTS**

No matter how advanced diagnostic equipment becomes as veterinary medicine progresses, one of the most valuable diagnostic tools for any patient is the recording of a complete patient history. In many practices, the veterinary technician is responsible for this process, with the veterinarian asking supplemental questions to clarify or verify the information provided to the technician. When taking a patient history for a cat with LUTS, it is very important to gather as much information about the signs themselves and the cat’s current and recent environment (Sidebar).

In addition to a thorough history, a complete physical exam should be performed by the veterinarian—particularly noting the feel of the urinary bladder and/or any abdominal pain on palpation. Additional diagnostics that are helpful in diagnosing cats displaying LUTS include a complete urinalysis to investigate for evidence of hematuria, pyuria (white blood cells in the urine), bacteriuria, crystalluria, and proteinuria, as well as the urine specific gravity, which can help differentiate between lower urinary and upper urinary tract disease. Because bacteria are not always seen on...

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**Sidebar:**

**LUTS Patient History: Questions to Ask**

**TIMING:** When did the LUTS begin? How frequently do they occur? **---**

**URINATION BEHAVIOR:** If periuria is involved, where does the cat typically urinate? Does it urinate on flat surfaces or does it spray vertical surfaces? Is blood seen in the urine? Does the owner witness the cat urinating (or trying to urinate) more frequently than normal? Does the cat ever attempt to urinate but produce little to no urine? Is the cat producing normal-sized, larger-than-normal, or smaller-than-normal urinations? Does the cat show signs of pain during urination, such as hissing, or running away immediately after urinating? **---**

**GENERAL BEHAVIOR:** Is the cat showing changes in its behavior, such as more hiding, increased aggression, clinginess to the owner, decreased appetite, etc.? **---**

**PREDISPOSING EVENTS:** Is there anything that frequently happens just before LUTS are seen (e.g. interactions with another pet or human)? **---**

**ENVIRONMENT:** Does the cat live indoors, outdoors, or a combination? Are there other pets in the household? Are any of them new or has their behavior toward the patient cat changed? What humans live in the household? Are any of them new or has their behavior toward the patient cat changed? Are there any other changes, such as construction, visitors, new noises, weather changes, etc.? **---**

**DIET:** What does the pet eat during the course of a day? What treats or “extras” does the pet get? Has there been a diet change? What was the pet eating previously and when was the change? **---**

**MEDICATIONS/SUPPLEMENTS:** What prescription medications, over the counter medications, or supplements is the cat given? **---**
Urinalysis even if a urinary tract infection is present, starting a microbial culture is also a wise idea. Because reference laboratory culture and antimicrobial sensitivity testing can be expensive and because urinary tract infection is less common than other causes of LUTS, some practices begin the culture incubation in-house, and only send the plate for bacterial identification and sensitivity if growth occurs. Diagnostic imaging of the cat’s upper and lower urinary tract is helpful to rule out uroliths (radiographs) and neoplasia (ultrasound). More advanced imaging may be undertaken in refractory cases. To determine the overall health status of the cat, and particularly of the kidneys if the owner is unsure if the cat is displaying pollakiuria or polyuria, a complete blood count and serum chemistry analysis may be warranted as well.

Feline Idiopathic Cystitis and Stress

In many cases, the results of diagnostic tests do not reveal an obvious cause for the cat’s LUTS. Urinalysis and culture do not indicate infection or crystalluria, and imaging does not indicate uroliths or other physical abnormalities. Indeed, most cats with LUTS have what is referred to as feline idiopathic cystitis (FIC). Though it is the most common cause of urinary signs in cats, it is a diagnosis of exclusion at this time, and its exact causes are still under investigation. Several risk factors for FIC have been identified somewhat consistently across many studies, however. Male cats between the ages of 2-7 years are most at risk. Being overweight or obese can also increase risk of FIC. In most studies, eating dry food did not seem to predispose cats to FIC, but other environmental factors did. Individual environments are difficult to compare, but much of the data seems to indicate that stress plays a significant role in triggering FIC in predisposed individuals.

Why would cats be stressed? Many pet cats live seemingly dreamy lives—safe and warm indoors with human, dog and cat “friends,” getting to nap all day and never having to go to work. While this may sound like an idyllic life to us, cats are not small people and have very different behavioral and environmental needs. While keeping cats indoors keeps them safe from predators, fights with other cats, vehicular accidents and weather exposure, it may also limit their ability to engage in deeply ingrained species-specific behaviors like foraging and hunting. Most owned cats, both those who live indoors and those who spend time outdoors, are fed in meals or ad libitum. This reduces or eliminates the need for, or ability to, spend what would normally be a large portion of the day seeking small, frequent meals. This feeding style and reduced physical activity can also lead to obesity, which compounds the risk factors for FIC.

The natural social dynamics of cats are complicated—once thought to be solitary by nature, it is now understood that cats will form social groups if resources are sufficient. Insufficient resources, including not just food but also territory, safe resting/observation places, and litterboxes, can cause intercat aggression. Many pet cats live in multi-cat households and while generally provided enough food by volume, may have the perception that food resources are insufficient if all cats are required to share one food dispenser or eat in proximity. Other resources, like preferred spaces and litterboxes, are also likely to be in quantities that require competition. Other non-feline occupants of

It is important to educate pet owners that stress leads to real, painful changes in the urinary bladder tissue. The pet is not urinating in unacceptable places as a way to “get back at” the owner for the stressful situation.
the house, like rambunctious dogs or small children, can also cause stress to cats. When gathering a history from a cat owner, simply asking, “Do you think your cat is stressed?” may not prompt a positive answer, simply because many owners are not aware of the species-specific behavioral needs of cats, and do not perceive the life they provide their cat as stressful. It is favorable to ask more detailed questions about what other house occupants (human and animal) interact with the cat and how, where the cat prefers to spend time, how often the cat comes out to initiate interaction, etc. Asking the owner to describe the environment and behavior of the cat, rather than making a judgment call on the cat’s emotional state, will provide more objective information.

How does stress impact physiological systems like the urinary tract? It’s important to note that acute, short-lived stress is not always detrimental, and can initiate advantageous behavior in an animal. The acute stressor of seeing a predator leads the prey animal to run or hide. The acute stressor of hunger leads the animal to seek food. Numerous complicated neurologic and hormonal pathways govern the stress response. In a normal stress response, the external stimulus acting as a stressor is perceived by the animal via its senses. That information is transmitted to the brain, where the hypothalamus releases corticotropin-releasing factor (CRF) to initiate a cascade of events. The CRF stimulates the anterior pituitary to release adrenocorticotropic hormone into the bloodstream. This hormone stimulates the adrenal glands to release glucocorticoids, including cortisol. Commonly known as the “stress hormone,” cortisol has many effects during the stress response that better enable the animal to mobilize energy to deal with the stressor. Increasing levels of cortisol feed into a negative feedback loop that tells the hypothalamus and pituitary to inhibit production of CRF and ACTH, thus allowing the animal to return to homeostasis when the stressor is dealt with. This hormonal loop is called the hypothalamic-pituitary-adrenal (HPA) axis.

Simultaneously, the release of CRF activates the sympathetic nervous system (SNS). This results in the release of catecholamines, notably epinephrine and norepinephrine, which also help enable the pet to deal with the stressor (sometimes referred to as the “fight, flight or freeze response”). In normal stress responses, cortisol has a negative feedback effect on this pathway. It has been reported that cats with FIC have smaller adrenal glands than control cats, and that cortisol fails to inhibit the SNS response, allowing the stress response to continue and potentially affecting physiological aspects of the urinary bladder, like tissue permeability and sensory activity. While this level of detail is unnecessary to explain to most pet owners, it is important to educate them that stress leads to real, painful changes in the urinary bladder tissue. The pet is not urinating in unacceptable places as a way to “get back at” the owner for the stressful situation.

Management of FIC and Stress in Cats
Many attempts have been made at treating cats with FIC, though only a few of them are substantiated with evidence. Because many incidences of FIC only last 1-7 days, it can seem as though treatments may be effective when they are no better than placebo. Unfortunately, many cats have recurrent bouts of FIC, so preventing recurrence is a better measure of effective treatment than ending a single bout. Psychoactive medications are sometimes utilized in the management of cats with FIC. Of these, amitriptyline, a tricyclic antidepressant, has been the subject of few studies with equivocal results. There may be some benefit to long term administration of the drug in some cats with recurrent episodes if other therapies fail, though there is little for its use in the short term. Fluoxetine is a commonly used drug for problems assumed to be behavioral or psychological in nature, but its use in FIC has not been studied.

Environmental management
While it is difficult to conduct true placebo-controlled, client-owned patient trials for multimodal environmental modifications (MEMO) because no two environments are exactly alike, the studies that do exist on MEMO indicate that it is useful in relieving the symptoms of FIC. Cats with FIC have been demonstrated to have higher levels of circulating catecholamines than healthy cats during periods of stress and this improved with environmental enrichment. After a thorough history is completed to document the cat’s environment and housemates, strategies to provide enrichment and allow a more “normal” behavioral repertoire and avoid specific stressors should be implemented. Cat owners may
need help brainstorming creative ways to achieve this, which is an area that educated veterinary technicians can be extraordinarily helpful. Owners may have initial mental blocks against taking some of the steps that would help the cat, due to a busy lifestyle, home layout or design aesthetic, but there are usually solutions that can be implemented that are satisfactory to the owner and beneficial to the cat. In multicat households with negative intercat dynamics, it may not be possible to separate the cats permanently. Still, the owner can be coached to provide more vertical climbing and resting spaces (many design-friendly options exist now), escape routes from areas where the cats get cornered or stuck (a simple chair or stool that allows a cornered cat to jump up, over and past an aggressive housemate may be all that is needed in some cases), multiple food and water bowls and an increased number of litterboxes. Litterbox sanitation, substrate type and box shape should also be evaluated, as many cats have preferences. If dogs or children are creating stress for the cat, the owners may consider giving the cat a room that only it can access by blocking the entrance with a baby gate or cat door (size-specific or microchip-activated to keep a dog out).

Changing the feeding schedule or method for cats may provide environmental enrichment as well. Timed automatic feeders that dispense small amounts of food throughout the day, hiding food throughout the house or using interactive toys can all be employed to simulate the natural hunting and foraging behaviors and engage more of the cat’s daily time budget. These strategies can be more complicated, but not necessarily impossible, in multi-pet households. Microchip activated feeders are available, or interactive toys can be provided for specific time periods when the animals are separated.

**Pheromones**

Animals secrete naturally occurring chemicals that they use to communicate with each other. They are similar to scents, but may affect the animal without conscious detection through a sensory organ. A synthetic analogue of feline facial pheromone is commercially available in a variety of forms, including diffusers, sprays and wipes (Feliway, Ceva Pharmaceuticals). The evidence on the benefit of facial pheromones on feline stress or FIC is mixed. One study showed an improvement in the behavior and stress score of cats during veterinary examination, while another study failed to demonstrate statistically significant effects on salivary cortisol or stress in shelter cats. Facial pheromones do not appear to have documented adverse effects, but can be costly, so use as an adjunct management tool should not be harmful if the owner desires to do so, but should not be utilized as the sole attempt at treatment.

**Nutrition**

Convincing evidence does exist for the use of certain therapeutic urinary diets and supplemental ingredients to control the symptoms and recurrence rate of FIC. As FIC is an inflammatory condition, diets containing anti-inflammatory ingredients like ω-3 fatty acids (EPA and DHA) are beneficial.
and antioxidants like Vitamin E and α-carotene appear helpful. In addition, although FIC itself is not a crystalluria-based condition, diets should be controlled in the minerals that act as building blocks of struvite and calcium oxalate crystals, to avoid concurrent LUTS. In a double-blind, placebo-controlled, multicenter clinical trial, a multipurpose therapeutic urinary diet was found to decrease the recurrence rate of FIC in non-obstructed cats by 89% over the course of a year compared to a control food.11

Some supplemental ingredients and nutraceuticals have been studied as well. L-tryptophan, an essential amino acid commonly found in poultry, eggs, salmon and other foods, has been demonstrated to reduce stress and anxiety behaviors in cats, including fighting, vocalization and stereotypies (repetitive behavior).12 L-tryptophan can be transported across the blood-brain barrier to be converted into serotonin, an important neurotransmitter involved in mood improvement, cognition and antidepressant treatments. Serotonin itself cannot cross the blood-brain barrier, and therefore cannot be supplemented orally to the same effect. Another compound with anxiolytic effect is derived from casein, a ruminant milk protein. It is referred to as α-casozepine, milk protein hydrolysate (MPH) or hydrolyzed casein, depending on the source. The definite mechanism of action of MPH is unknown, though it is thought to potentially act on gamma amino butyric acid (GABA) receptors, dopamine and/or serotonin levels to enhance mood and decrease anxiety. The emotional scores of housecats were demonstrated to improve with 8-week administration of MPH.13 A version of the therapeutic urinary diet referenced in the study above was released with the addition of L-tryptophan and MPH and has been the subject of two recent papers. In a case series of 10 cats with FIC, emotional parameters, quality of life, overgrooming and most LUTS improved in 8 weeks on the diet.14 A more recent study showed significant reduction in recurrent FIC episodes in cats fed the diet compared with cats fed commercial over the counter control diets over the 5-week study period.15

As cat owners need to feed their cats daily anyway, and it is a non-invasive treatment compared to the administration of oral or injectable medications, the evidence for nutritional management of FIC with therapeutic diets designed with bladder health and containing anxiolytic ingredients is compelling. Overall, evidence points to a combination of multimodal environmental modification and nutritional management as treatments of choice for cats with FIC.

**DR. HILLARY NOYES**

Dr. Hillary Noyes completed her Bachelor of Science in Zoology at Michigan State University, with a concentration in animal behavior and neurobiology. She continued on at MSU’s College of Veterinary Medicine for her DVM. During that time, she participated in research on the human-animal bond and applied farm animal welfare science. Dr. Noyes completed a small animal medicine and surgery internship in San Diego, CA, where she remained as a practicing veterinarian for the next 5 years.

Dr. Noyes joined Hill’s Pet Nutrition as a Professional Consulting Veterinarian for the Southern California region in 2012. In 2018, she transitioned to the role of Assistant Manager, Students and Recent Graduates, where she helps manage veterinary student education and recent graduate engagement. Dr. Noyes is enrolled in an alternative track residency with the American College of Animal Welfare, where she hopes to become board certified. She is a member of the AVMA, the American Association of Industry Veterinarians and has served as a member of the AVMA’s Committee on the Human-Animal Bond.
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points to a combination of multimodal environmental modification and nutritional management as treatments of choice for cats with FIC.

**REFERENCES**


**LET’S REVIEW...**

1. What are two important components of FIC diagnosis and management that veterinary technicians can play a crucial role in? Choose 2:
   a. Taking a thorough history, including behavioral, environmental and nutritional information.
   b. Diagnosing crystalluria vs FIC
   c. Communicating creative environmental modification strategies to owners
   d. Visiting the owner’s house to administer oral medications daily

2. What two supplemental ingredients have been found to help reduce the signs of stress and anxiety in cats with FIC? Choose 2:
   a. L-theanine
   b. L-tryptophan
   c. α-casozepine
   d. Gamma amino butyric acid

3. What treatment strategy is NOT recommended for cats with FIC? Choose 1:
   a. Multimodal environmental modification
   b. Achieving an ideal body weight if the patient is overweight
   c. Feeding a therapeutic urinary diet with studies showing reduction in FIC
   d. Punishing the cat for urinating in unacceptable places

4. Which organ, important in the stress response, has been demonstrated to be smaller in cats with FIC? Choose 1:
   a. Adrenal glands
   b. Hypothalamus
   c. Anterior pituitary gland
   d. Kidneys

5. Which of the following has the best evidence for treatment of cats with FIC? Choose 1:
   a. Glucosamine chondroitin
   b. Targeted therapeutic nutrition
   c. Antimicrobial therapy
   d. Fluoxetine
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What does “-biotics” have to do with it?

Iveta Becvarova, DVM, MS, DACVN
Director, Global Academic & Professional Affairs, Hill’s Pet Nutrition Inc.

How to make the choice to positively modulate gut microbiota with prebiotics, probiotics, synbiotics, or antibiotics?

LEARNING OBJECTIVE:
Readers should gain an understanding of the conditions associated with dysbiosis in dogs and cats, its diagnosis and being able to utilize dietetic options to manage aberrant gut microbial communities.

The gut microbiota of dogs and cats is made up of a large number of commensal microorganisms that are considered to be generally non-pathogenic. The microbiota functions in a unique symbiotic relationship with the host’s defenses and immune system to protect against pathogen invasion and colonization. Microbiota protects the host by utilizing multiple mechanisms and metabolic functions. As such, healthy microbial population is an important determinant of host health and loss of the microbial balance has been associated with a variety of gastrointestinal (GI) and systemic disorders.

It is recognized that many gastrointestinal and systemic disorders are associated with aberrant gut microbial communities or dysbiosis. These aberrations appear to be both cause and consequence of the disease process. Nevertheless, it is suspected that changes in microbial communities resulted in decreased short-chain fatty acids (SCFA) synthesis, increased putrefactive compounds, and altered bile acid metabolism, which can potentially promote inflammation within the gastrointestinal (GI) tract.1

Dysbiosis vs eubiosis
Healthy gut microflora is in a state of healthy balance or eubiosis, which is defined as large bacterial and functional diversity. Although the abundance of bacterial species and functional products are not always correlated, in general, a reduced diversity and predominance of individual bacterial species is characterized as unhealthy microflora or
Dysbiosis. Dysbiosis doesn't always involve pathogens. The absence of key commensal species can be detrimental even without the presence of pathogens. The association of dysbiosis with variety of diseases suggests that interventions that can revert dysbiosis to eubiosis will aid in disease management, healing, and recovery.

Causes of dysbiosis
Dysbiosis is commonly present in dogs and cats with acute or chronic GI diseases, although the cause and effect is not completely understood (Table 1). It is reported that dogs with chronic enteropathy (CE) have dysbiosis characterized by decreased bacterial diversity and richness as well as decreased fecal concentrations of acetate and propionate when compared to their healthy counterparts. Alterations of mechanisms that help regulate bacterial colonization in the intestine, such as disrupted secretion of fluids with antibacterial properties (gastric acid, bile salts, pancreatic enzymes), disrupted intestinal motility or ileocolic valve function, or partial obstruction can all lead to dysbiosis. It is also suspected that German shepherd dogs and Rottweilers are predisposed to dysbiosis, possibly due to dysregulation in cell-mediated immune response to normal luminal microbiota. Dysbiosis can also result from disruption of intestinal environment, such as changes in pH, oxygen levels, and the presence of blood.

Dysbiosis can be induced by drugs, particularly with antibiotics, NSAIDs, or acid suppressant therapy. The severity of intestinal NSAID injury appears to be influenced by the presence of the resident microbiota. This phenomenon has been observed in germ-free mice which only developed NSAID-induced lower intestinal injury after being colonized with gut bacteria. Moreover, broad-spectrum antibiotics markedly reduce NSAID-induced small intestinal ulceration in rodents. Although antibiotics provide relief under certain conditions of GI disease in dogs and cats, they can result in long-term shifts of some bacterial taxa. Dietary associated dysbiosis has been reported in dogs fed high-protein raw meat based diets. Finally, the presence of dysbiosis in the GI tract has been shown to be associated with systemic extraintestinal disorders as well.

Diagnosis of dysbiosis
There are currently no exact criteria or practical diagnostic tests established to confirm the diagnosis. There is an overlap in the dysbiosis patterns of many GI diseases, thus no specific dysbiosis patterns for GI diseases have been described that can be used diagnostically to distinguish among various enteropathies. Small intestinal dysbiosis should be suspected in patients with increased serum folate and decreased serum cobalamin concentrations, since intestinal bacteria consume folate and produce folic acid. Unfortunately, these alterations are not highly specific for small intestinal dysbiosis, because cobalamin and folate uptake can be affected by several mechanisms. Inflammation of the ileum may damage cobalamin receptors and thus may lead to cobalamin malabsorption. Furthermore, a diet high in folate may lead to increased serum folate concentrations independent of the disease. A fecal canine dysbiosis index has been developed but this method is currently not accessible for routine diagnostics. Therefore, a history, presence of clinical signs, and positive response to dysbiosis treatment can all support the diagnosis.

Management of dysbiosis
There are several options available to clinicians to modulate dysbiosis, ameliorate clinical signs, and restore balance of the microbial community within the GI tract. These options include dietary modification, administration of prebiotics, probiotics, synbiotics, or antibiotics, and more recently, fecal microbiome transplantation (FMT).

Prebiotics
Prebiotics are selectively fermented dietary ingredients that have the capability to modulate specific changes in the composition and/or functional activity of the GI microbiota via fermentation to provide benefits to the host. Mechanism of action is that prebiotics selectively nourish commensal gut microbial populations resident to the animal and may increase their abundance and productions of functional end products (postbiotics) synthesis. Prebiotics pass through the GI tract until they reach areas of high microbial population where they become digested by microbial enzymes. Examples of prebiotics include fructo-oligosaccharides (FOS), mannan-oligosaccharides (MOS), inulin, beet pulp, or flax seed fiber.

A number of studies have evaluated the effects of prebiotics in dogs and cats and promote GI health. The indicators of GI health measured in those studies variably included are fecal scores, stool pH, microbial composition or fermentation end products. The traditional indicators associated with GI health include increased concentrations of fecal Bifidobacteria, Lactobacilli, increased concentrations of metabolites such as butyrate and polyphenols, indoles, increased ileal IgA concentrations and decreased C. difficile, C. perfringens, E. coli, and protein catabolites (e.g., ammonia, phenols, biogenic amines,

### TABLE 1. CAUSES OF DYSBIOSIS

| Acute and chronic diarrhea                                                                 |
| Disruption in secretion of fluids with antimicrobial properties within the gastrointestinal tract (gastric acid, bile salts, pancreatic enzymes) |
| Disrupted intestinal motility or ileocolic valve function and partial intestinal obstruction |
| Breed predisposition (German shepherd dogs, Rottweilers)                                    |
| Changes in intestinal luminal pH, oxygen levels, and presence of blood                      |
| Drugs (antibiotics, NSAIDs, acid suppressants)                                             |
| Diet change                                                                                |
| High-protein and raw meat based feeding practices                                         |
and sulfur-containing compounds).

The prebiotic effect in dogs has been well established for FOS, chicory, oligofructose, yeast cell wall (YCW) extract, beet pulp, and various blends of fermentable carbohydrates.3-9 When properly dosed in the food formulation, these prebiotics promote excellent stool quality without compromising nutrient digestibility and produce postbiotics beneficial to gut health.

Addition of certain prebiotics to food may also positively influence gut microbiota of obligate carnivores like cats. Cats fed food supplemented with FOS had increased Bifidobacterial concentrations while counts of E. coli decreased.10 Inclusion of pectins increased Lactobacilli concentrations along with C. perfringens and E. coli, which could be considered a negative health effect by feeding pectin as a sole prebiotic source to cats.10 Nevertheless, cats in this study did not exhibit clinical signs of GI disease, thus they likely did not harbor pathogenic strains of C. perfringens or E. coli or the microbial balance was not affected to the degree to trigger the signs.

Supplementation of fructan as a prebiotic into feline canned food decreased some protein catabolites in the feces and E. coli concentrations.11 These data provides evidence that even though cat is an obligate carnivore, the gut microflora is amenable to prebiotic supplementation which can beneficially modulate gut health.

Recently, Hill’s has developed the ActivBiome+™ technology, a proprietary blend of fibers shown to nourish and activate gut microbiome to promote digestive health. The ActivBiome+™ technology consists of both soluble and insoluble fibers specifically chosen for their unique properties, prebiotic activity, water holding and stool bulking capacity, and fiber bound plant compounds with antioxidant and anti-inflammatory properties. Hill’s has compiled a substantial body of evidence supporting the benefits of ActivBiome+™ technology in both cats and dogs.9,12-14

In one dog study, the test food with ActivBiome+™ technology significantly decreased total putrefactive fecal branched SCFAs (isobutyric, 2-methylbutyric, and isovaleric acids), increased fecal acetic acid, and decreased fecal ammonium compared with control food.14 Activbiome+ in the test food improved stool scores, increased fecal saccharolytic products such as ribulose/xylulose and arabinose derived from fiber. Furthermore, ActivBiome+™ in the test food increased fecal antioxidant and anti-inflammatory plant compounds such as hesperidin, ponciretin, limonin, sinensetin, naringenin, diosmetin, eriodictyol, and narirutin compared with control food (Figure 1). The acetate- and lactate-producing genera Bacteroides and Faecalibacterium were significantly increased while Streptococcus and Enterococcus were significantly decreased compared with control food not containing Activbiome+. In this study, the test food with ActivBiome+™ shifted the GI microbiome composition and their metabolism toward saccharolytic fermentation and decreased putrefactive metabolites, while improving fecal scores.

The test food was further evaluated in a prospective clinical study involving 31 adult dogs with predominantly large bowel diarrhea, recruited from private veterinary practices across the United States.25 The test food significantly decreased fecal putrefactive metabolites, including, isobutyric, 2-methylbutyric, and isovaleric acids, as well as, decreased fecal ammonium compared with baseline. In addition, the test food increased fecal saccharolytic products derived from fiber compared with baseline. Furthermore, the test food significantly increased fecal antioxidant and anti-inflammatory plant compounds, as well as, postbiotics produced by microbial metabolism such as secoisolariciresinol, hesperidin, ponciretin, naringenin, and 4-hydroxycinnamate as compared with baseline. This study suggested that fiber sources rich in antioxidant and anti-inflammatory compounds may contribute to long term GI health.

An additional study in dogs evaluated the ActivBiome+™ technology in different food...
Plant-derived Compounds

![Diagram of plant-derived compounds](image)

**Figure 2.** Antioxidant and anti-inflammatory plant compounds and beneficial microbe-derived postbiotics were significantly higher in feces from cats fed the test food for 4 and 8 weeks compared with the control food. Plot shows log-transformed data.

*Red: Control food; Purple: Test food 4 weeks; Green: Test food 8 weeks.*

backgrounds, including hydrolyzed meat and grain rich foods. In both cases, the fiber inclusion provided several GI benefits, including improved stool quality, lowered stool pH, increased beneficial gut microbes, and changed microbial metabolites to indicate improved colonic health.

In one study with healthy adult cats, the test food with ActivBiome+™ technology significantly increased fecal acetic and propionic acids, decreased putrefactive metabolites such as isobutyric, 2-methylbutyric, and isovaleric acids, increased moisture, and decreased pH compared with control food while maintaining acceptable stool scores. The test food with ActivBiome+™ significantly increased fecal saccharolytic products ribulose/xylulose, maltose, and arabinose as well as fecal anti-inflammatory and antioxidant plant compounds compared with control food at weeks 4 and 8 (Figure 2). The bacterial genera *Peptococcus, Succinivibrio, and Enterococcus* were significantly decreased compared with control food not containing ActivBiome+™ at 4 and 8 weeks while *Blautia, Bacteroides, and Turicibacter* were significantly increased compared with control food at 4 and 8 weeks. Predicted microbial functions representing arginine, butyrate, phenylalanine, propionate, tryptophan and tyrosine metabolic pathways were significantly different from the control food at 4 weeks. Here too, the test food with ActivBiome+™® shifted the GI microbiome composition and metabolism of cats toward saccharolytic fermentation and decreased putrefactive metabolites, characteristics which may provide benefits for GI health.

In another study using the same test food with ActivBiome+™ and control food without this fiber technology, 30 adult cats (healthy or with mild GI distress) consumed the control food during a 3-week pre-feeding phase (Hill’s data on file 2019) and then cats were randomized to either control food or test food for a 4-week treatment period then crossed to the opposite food for 4 weeks. The test food with ActivBiome+™ significantly increased fecal propionic acid and decreased pH compared with the control food while maintaining acceptable stool scores. The test food with ActivBiome+™ increased fecal saccharolytic products. Fecal anti-inflammatory and antioxidant plant compounds from citrus and from flax were increased in test food-fed cats. In this study, the test food with fibers rich in polyphenols and fermentable carbohydrates improved parameters associated with GI health.

These results indicate that carefully selected prebiotics in specific proportions as a part of a properly formulated food can beneficially and consistently impact canine and feline health by modulating microbiome metabolites without exhibiting negative side-effects.

**Probiotics**

Probiotics are defined as live microorganisms, which when consumed in adequate amounts confer a health benefit to the host. The proposed mechanism of action includes displacement of intestinal pathogens, production of antimicrobial substances (e.g. fatty acids, lactic and acetic acid), enhancement of immune responses, and upregulation of various metabolites. For successful use as a probiotic to provide health benefit to the host, the bacterial species should be of host intestinal origin, demonstrate good adhesion ability to intestinal mucus and able to exclude the adhesion of common enteric pathogens.

Although used in veterinary patients for over a decade, very little is known about the appropriate dosage of different probiotic strains for dogs and cats to manage GI diseases. Quality control of probiotics products is an issue in many countries, and not much data is available on the shelf-life or survival in commercial kibble products on the market. Although, it is debatable if probiotic survival is necessary for a beneficial effect or whether just the DNA is sufficient. One study evaluated microbial components of dog food claiming to contain probiotics. None of the 19 products contained all the claimed organisms in a viable state. Eleven samples contained additional organisms and more than 25% of tested foods showed...
no relevant bacterial growth.
Limited data with some inconsistent results on the effectiveness is available for use of probiotics in dog and cat GI patients.

Canine acute diarrhea
- Parvoviral enteritis: A probiotic mixture VSL#3 administered to puppies with confirmed parvoviral enteritis in a randomized manner resulted in increased percentage of surviving dogs (90% in probiotic group vs. 70% in the non-probiotic group), and a more rapid improvement of clinical scores.21
Parasites: A mixture of lactic acid bacteria for 28 days significantly reduced Anclyostoma eggs shedding in dogs when compared to control group.22
On the contrary, administration of E. faecium SF68 for 6 weeks to dogs with giardiasis did not result in reduction of cyst shedding, fecal antigen shedding or fecal IgA or leucocyte phagocytic activity when compared to untreated dogs.23

- Stress associated (e.g. kenneling stress) diarrhea: E. faecium SF68 had no effect on kennel stress-associated diarrhea in dogs.24 In another randomized prospective controlled study, E. faecium SF68 administration to teaching colony dogs for 102 days was not effective at reducing occurrence or frequency of diarrhea, vomiting, and inappetence.25
Conversely, fecal scores were significantly improved in dogs undergoing kenneling stress when supplemented with Bifidobacterium animalis AHC7 compared with an untreated control group.26
The same probiotic strain significantly reduced the time to resolution of clinical signs and the number of dogs receiving metronidazole in a study of acute idiopathic diarrhea.27 Similar results were seen in a randomized controlled acute gastroenteritis study using a probiotic cocktail, with probiotic group having significantly reduced recovery time when compared to control.28

Canine chronic diarrhea
- Chronic enteropathy (CE): A probiotic mixture with VSL#3 strains formulated for pets was given to dogs with idiopathic IBD for 60 days and was compared to the treatment with combination of prednison and metronidazole. Thirty days after the treatments, both groups were clinically and histologically better.29 In another randomized controlled study, a similar probiotic mixture was given to dogs with IBD on a standard therapy with elimination diet and prednisone for 8 weeks. Both interventions resulted in rapid clinical remission. The probiotic group had upregulation of tight junction proteins indicating positive effect of probiotic on mucosal homeostasis.30

- Food Responsive Diarrhea (FRD): A probiotic mix supplement was given to dogs with FRD in a randomized, placebo-controlled and blinded fashion for 4 weeks.31 All dogs were fed an elimination novel protein dietetic food. All dogs in this study clinically improved, showing no effect of probiotic supplementation. Other study reported that German Shorthair Pointers dogs with non-specific dietary sensitivity receiving probiotic L. acidophilus, showed improved fecal consistency, fecal dry matter and defecation frequency as compared to a control group.32

The studies available on canine chronic diarrhea studies are often confounded with feeding an elimination diet, which alone could have resulted in beneficial effects. As such it is not appropriate to make clear conclusions about the effectiveness of probiotics under these GI conditions.

Feline diarrhea
The number of studies available on the effectiveness of probiotics on diarrhea in cats is largely limited. A double-blind placebo-controlled study evaluating the effect of E. faecium SF68 on the incidence of diarrhea in sheltered 217 cats demonstrated that cats fed the probiotic had decreased episodes of diarrhea as compared to placebo group.24 Studies on probiotic applications for IBD in cats are lacking.

Feline constipation and megacolon
A multi-strain probiotic was administered to cats with constipation and megacolon for 90 days. The probiotic supplementation resulted in clinical improvement but this was a small pilot study. Further evaluation in larger feline population is needed to confirm the potential positive effect.33

Synbiotics
Synbiotics are preparations combining both probiotics and prebiotics. They were created in order to overcome some possible difficulties in the survival of probiotics in the gastrointestinal tract. Therefore, an appropriate combination of both components in a single product should ideally ensure a superior effect, compared to the activity of the probiotic or prebiotic alone. The number of studies evaluating synbiotic effect on GI disease in dogs and cats is largely limited.

Dogs diagnosed with chronic enteropathy (CE) were receiving hydrolyzed elimination food plus either a synbiotic product containing E. faecium or placebo for 6 weeks. Only 27% of dogs finished the trial and there was no difference between the groups regarding clinical efficacy or histologic scores.34
A synbiotic was administered to cats with chronic diarrhea for 21 days, while
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no changes were made to ongoing treatment(s) or diet. The mean fecal score significantly improved and 72% of owners perceived an improvement in their cat’s diarrhea. The main limiting factor of this study was the lack of a control group to confirm the synbiotic effect.

Antibiotics
Antibiotics are used to treat infectious gastroenteritis and remain a component of sequential therapy of CE in dogs and cats. There are certain bacteria found within GI tract of healthy dogs and cats (e.g. Clostridium perfringens, Clostridium difficile), which can lead to GI disease under specific conditions. While antibiotics result in clinical improvement in subset of diarrhea patients, they have capacity to alter composition of the gut microbiota by decreasing richness and diversity. The gut microbiome may recover in days or weeks but in some cases it takes considerably longer. Both drugs metronidazole and tylosin, have been associated with gut microbiome disturbances post treatment. These microbial composition changes were associated with clinical signs of GI disease in a subset of animals. In one study, 14-day administration of metronidazole to healthy dogs led to development of diarrhea in 9 out of 16 dogs, which resolved after the end of administration. Similarly, 13 out of 18 dogs that received intramuscular injections of lincomycin developed diarrhea. In recent study, 34 cats were receiving amoxicillin-clavulanate for 7 days, and majority of them developed signs of GI disease with worsening of fecal scores. While antibiotics will continue to be a front line therapy for acute infectious conditions, the degree to which proactive microbiome replenishment strategies can restore health following the infection require further study in dogs and cats.

What is a better choice to improve gut microbiota—prebiotics or probiotics?

Based on the current veterinary studies, it is clear that probiotics are not created equal. They can shift gut microbial populations to some degree in a subset of animals but these changes are dose dependent and transient, and the effect diminishes when discontinued. Preferentially, high doses of multi-strain products administered over prolonged periods of time appears to be needed to maintain the viable counts of probiotic species in the gut. Quality control of probiotic supplements is not adequate in many countries, which makes choice of some probiotic supplements problematic for safety reasons.

On the contrary, prebiotics nourish the desirable bacteria which are resident in the GI tract and allows them to grow and out-compete the undesirable bacteria (Table 2), assuming the gut contains these beneficial species as residents. Furthermore, prebiotics have tremendous capacity to feed the entire community of microbes at once, not just isolated species. Additional benefit of prebiotics is that they can be fed daily as a part of a life-long feeding as they are sustainable and safe.

**Summary**

Gut microbial composition is influenced by multiple factors, including dietary change, feeding certain types of food, treatment with antibiotics, NSAIDs, or administration of pre- and/or probiotics. Although diagnostic tests are limited, history, clinical signs and response to the treatment can help to support dysbiosis diagnosis. The goal of managing dysbiosis is to help restore the balance of microbiota. The most common strategies to use in veterinary patients include prebiotics and probiotics. Evidence exists that prebiotics provide several advantages over probiotic and antibiotic use – they are convenient, effective, and can be fed as a part of the daily ration long term. Recently, Hill’s has developed the ActivBiome+™ technology, a proprietary blend of fibers shown to nourish and activate gut microbiome to promote digestive health. This makes prebiotics an important and effective management of gastrointestinal disorders with clinical benefits without adverse effects.
REFERENCES:


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