

The New York City Veterinarian

September, 2026
Volume 66, No. 3



PRESIDENTS MESSAGE

*David Wohlstadter-Rocha,
DVM*

Dear Colleagues,

As we move into the fall season, I am reminded of the strength and vibrancy of our veterinary community here in New York City. The VMA of NYC continues to thrive because of the dedication, expertise, and collegial spirit of our members, and I am grateful for the opportunity to serve this profession.



This fall brings several opportunities to connect, learn, and engage with colleagues. I encourage everyone to attend the upcoming New York Vet Show on October 29-30. Admission is included with your VMA of NYC membership. The conference offers New York State-approved continuing education credits, thought-provoking lectures from leading experts, and opportunities to interact with colleagues.

I am also excited to invite you to the VMANYC & NY SAVE Fall Mixer on October 28, 2026, from 7:00 PM to 10:00 PM at The Fleur Room. Our mixers have become a favorite tradition because they bring together veterinarians from diverse practice settings and career stages in a relaxed, welcoming environment. These gatherings remind us that our profession is strengthened not only through education but also through meaningful relationships and shared experiences. I look forward to seeing many familiar faces and welcoming new colleagues at this event.

A particular focus for VMA of NYC is supporting the next

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Calendar of Events

Program Committee - Megan McGlinn, VMD

The schedule of the VMA of NYC Continuing Education meetings and events for the 2026-2027 calendar year is listed below, including the speakers and topics.

September 9, 2026 - 7:00 - 9:00 pm

Location: Empire Steak House
Speaker: Sue Ettinger DVM, ACVIM (Oncology)

October 14, 2026 - 7:00 - 9:00 pm

Location: Arno's Ristorante
Speaker: Joseph Wakshlag, DVM, PhD, DACVIM (Nutrition), DACVSMR

October 28, 2026 - VMANYC & NY SAVE Fall Veterinary Mixer

Location: The Fleur Room, NYC

October 29-30, 2026 - NYVET Show

Location: Javits Convention Center

December 1, 2026 - 6:00 - 8:00 pm

Speaker: Sally Slavinski, DVM, MPH, ACVPM
Location: The Civilian Hotel

December 1, 2026 - Holiday Party

Location: Starchild Rooftop Bar & Lounge

January 13, 2027 - 6:00 - 8:00 pm

Location: Virtual

February 3, 2027 - 6:00 - 8:00 pm

Location: Virtual

March 3, 2027 - 6:00 - 8:00 pm

Location: Virtual

April 7, 2027 - 6:00 - 8:00 pm

Location: Virtual

May 5, 2027 - 6:00 - 8:00 pm

Location: TBD

June 9, 2027 - 6:00 - 8:00 pm

Location: Virtual

July 7, 2027 - 6:00 - 8:00 pm

Location: Virtual

September 8, 2027 - 6:00 - 8:00 pm

Location: TBD

October 6, 2027 - 6:00 - 8:00 pm

Location: TBD

New York Vet Show Schedule

VMANYC Clinical Theater

October 29, 2026

9:30 am - 10:20 am

Susan P. Cohen, DSW
VIN Foundation
Caring Without Crashing: Staying Healthy
Through a Long Veterinary Center

11:30 am - 12:20 pm

Erin Achilles, VMD, DACVIM (Cardiology)
Schwarzman Animal Medical Center
Recognition and Management of
Arrhythmias in General Practice

2:30 pm - 12:20 pm

Bashore Halow, CVPM, LVT
Health Care Providers Network
The Client Communication Lab: Inside the
Chemistry of Conversations That Work

10:30 am - 11:20 am

Ann Hohenhaus, DVM, DACVIM (Oncology and SAIM)
Schwarzman Animal Medical Center
Doc, What Happens If I Don't Treat His Cancer?

1:30 pm - :20 pm

Vanessa Spano, DVM, DACVB
Schwarzman Animal Medical Center
Behavior Considerations for the General Practitioner
Low Stress Handling, Veterinary Visit Anxiolytics,
and Preventive Care

3:30 pm - 4:20 pm

Joe Impellizieri, DVM, DACVIM (Oncology), MRCVS
Veterinary Oncology Services (VOS)
Update on Melanoma: Current Status of Diagnosis
and Therapy, Navigating the Pathway for Your Clients

October 30, 2026

9:10 am - 10:00 am

Michael Conguista, DVM, DAVDC
Prism Veterinary Dentistry
Systematic Interpretation of Dental Radiographs:
From Image to Diagnosis

11:30 am - 12:20 pm

Daniel Spector, DVM, DACVS-SA
Schwarzman Animal Medical Center
Beyond the Spay and Gastropexy: Advances in
Minimally Invasive Surgery

2:50 pm - 3:40 pm

Tomas Infernuso, DVM, DACVS
Animal Surgical Center
Spinal Surgery in Dogs: When to Cut, When to Wait,
When to Laser

10:30 am - 11:20 am

Lauren Wiley, VMD, DACVIM (Cardiology)
BluePearl Veterinary Partners—NYC
Feline Cardiomyopathies: Phenotypes and Updates

1:50 pm - 2:40 pm

Allison Rohde Newgent, DVM, DACVS (Small Animal)
Greater Staten Island Veterinary Services
Surgical Insights in Small Animal Wound Management

3:50 pm - 4:40 pm

Carol Ann Daidone, VMD, DACVIm (Neurology)
Natasha Spanos, DVM, MS, DACVR (RO)
Garden State Veterinary Specialists
Canine Brain Tumors: Diagnosis, Decision Making
and Therapy

Member Spotlight

Babette Gladstein, VMD



We are pleased to shine our Member Spotlight on Dr. Babette Gladstein, whose career reflects a longstanding commitment to animal wellness, rehabilitation, and longevity.

A graduate of the University of Pennsylvania School of Veterinary Medicine, Dr. Gladstein came to veterinary medicine as a second career, inspired by a desire to pursue work that was both useful and purposeful. Her first position in the profession was with the New York State Regulatory Track, providing her with a unique introduction to veterinary medicine.

For the past 25 years, Dr. Gladstein has practiced exclusively through house calls, bringing veterinary care directly to her patients in the comfort of their own homes. Her practice has developed a particular focus on wellness, rehabilitation, and longevity medicine, reflecting her passion for helping animals maintain their health, mobility, and quality of life.

Originally from Jersey City, New Jersey, Dr. Gladstein moved to New York City in 1980 and has made the city her home ever since. When she is not caring for her patients, her interest in animal health and wellness continues to be an important part of her life.

Dr. Gladstein is also the proud owner of two Mexican Hairless dogs, who undoubtedly benefit from having a veterinarian devoted to wellness and longevity in the family.

We are delighted to feature Dr. Babette Gladstein and recognize her dedication to providing personalized veterinary care and helping animals live healthier, longer lives.

President's Message continued ...

A particular focus for VMA of NYC is supporting the next generation of veterinary professionals. To that end, we are pleased to continue to offer complimentary access to our Fellows Program for 2025-2026 graduates and currently enrolled interns and residents in the New York metropolitan area for the remainder of 2026.

Launched in 2023, the Fellows Program was created as an accessible gateway to professional growth and community engagement. Fellows receive access to New York State-approved continuing education, including New York Vet Show, along with invitations to social events such as our Big Apple Mixer series. Participants also receive newsletters and updates on issues affecting veterinary medicine in our region, helping them stay informed while building connections with colleagues across New York City.

The Fellows Program is designed to help early-career veterinarians establish professional networks, advance their clinical knowledge, and become active participants in one of the most dynamic veterinary communities in the world. Those who attend at least two events during their complimentary participation period (excluding the NY Vet Show) will receive sponsorship of their first full year of membership in both VMANYC and the New York State Veterinary Medical Society, unlocking the complete range of membership benefits.

The future of our profession depends on fostering connections, sharing knowledge, and creating opportunities for veterinarians at every stage of their careers. I encourage recent graduates, interns, and residents to take advantage of this opportunity and become part of the VMA of NYC community.

Thank you for your continued commitment to veterinary medicine and to the animals, clients, and communities we serve. I look forward to seeing you at our upcoming fall events.

Sincerely,

David R. Wohlstadter-Rocha, DVM

When the Last Carriage Leaves the Park

An Opinion on History, Welfare, and a Silence That Still Troubles Me

By Anthony Miele, DVM, Treasurer, Veterinary Medical Association of New York City

If the City Council takes the vote now moving toward the floor, and if the Mayor does what he has pledged to do and signs the bill that reaches his desk, New York will close a chapter that began before the Civil War ended. That is not rhetoric. It is the plain arithmetic of the city's own history. Frederick Law Olmsted and Calvert Vaux designed Central Park's winding drives so that visitors could take in the landscape from a carriage. The park opened to the public in the winter of 1858–1859. By 1863, dedicated tourist carriage rides were being offered along those same drives at twenty-five cents a passenger. For more than 160 years, a working horse and a hired carriage have been part of how New Yorkers and visitors have seen the park. Forty-one mayors have come and gone while that ritual continued. If this legislation is enacted, that sight will almost certainly never return. Our children and grandchildren will know it only from photographs.

Wellness Corner

Leaving the White Coat at the Door

By Jennifer Tsung

For many of us, the workday doesn't end when the last patient leaves. Difficult cases, emotional client conversations, unfinished tasks, and patient concerns often follow us home, making it challenging to fully disconnect from the demands of practice. While this mental carryover is common, it can take a cumulative toll. Without an intentional transition from work to home, chronic stress can contribute to emotional exhaustion, disrupted sleep, strained personal relationships, compassion fatigue, and ultimately burnout.

The brain doesn't automatically shift from "clinical mode" to "home mode." Creating a deliberate end-of-day transition helps establish a separation between professional responsibilities and personal life, giving veterinarians the opportunity to recover from the day's emotional and cognitive demands while allowing them to be more present with family and friends. Although no strategy can eliminate the challenges of veterinary medicine, small, intentional habits can make it easier to leave work at work, improve overall well-being, and build resilience.

An intentional end-of-day regimen can help signal that the workday is complete. Rather than mentally carrying unfinished tasks home, take a few minutes to close out the day in a structured way and make a brief list of priorities for the following day. Writing unfinished tasks down reduces the mental burden of trying to remember everything after going home.

Equally important is creating a clear stopping point. Close your computer, silence work notifications, and remind yourself that today's work has been completed to the best of your ability. This process can reduce mental clutter, improve focus during personal time, and make it easier to work the next day with clarity and energy.

Use your commute home to transition between the demands of work and the responsibilities of home. Intentionally shift your mindset by listening to music, a podcast, or an audiobook, or practicing deep breathing techniques. This helps create space between your professional and personal roles and signals to your brain that the workday has ended.

How you enter your home can influence how quickly you transition from veterinarian to spouse, parent, partner, friend, or simply yourself. Establishing a consistent arrival ritual helps your mind shift from professional responsibilities to personal time. Actions such as changing out of work clothes, washing your hands, taking a few deep breaths, or spending a few minutes greeting your family and pets can help create a boundary between work and home.

Your environment also matters. Make your home a place that feels restorative and welcoming. Whether it's a comfortable chair, calming music, a favorite candle, fresh flowers, a tidy entryway, or a relaxing outdoor space, small touches can make coming home feel like an opportunity to recharge rather than the next item on your to-do list. Create a peaceful home environment by intentionally designing a space that supports relaxation, connection, and recovery after a demanding day. This helps reinforce the idea that home is a place to rest and renew.

In today's connected world, truly leaving work behind can be difficult. Establishing healthy technology boundaries helps protect personal time. Consider turning off nonessential work notifications,

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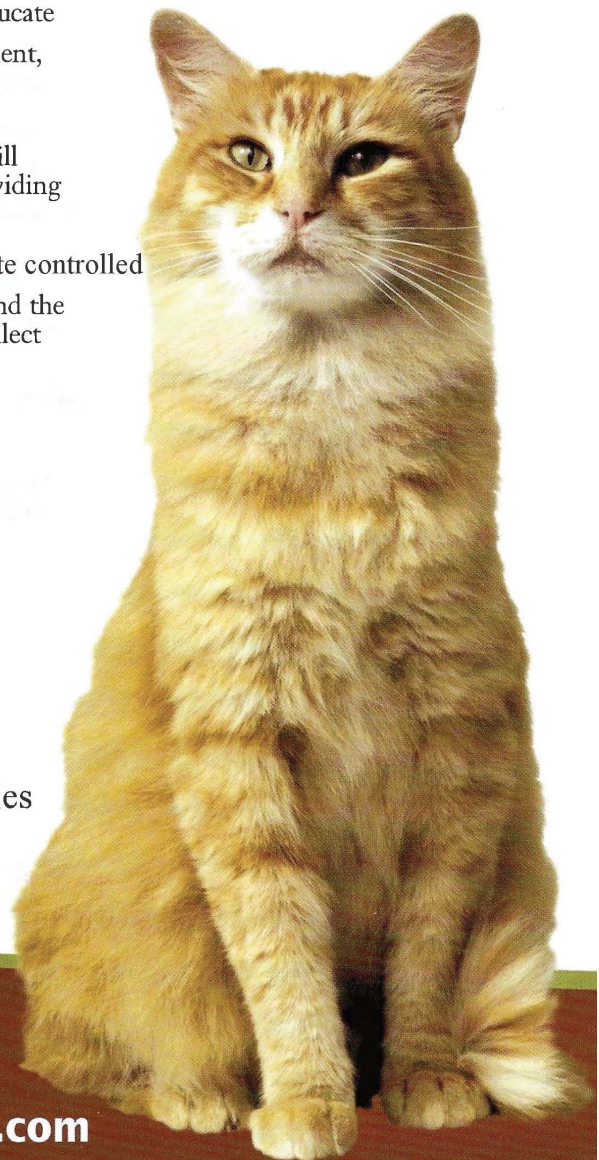
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Leaving the White Coat at the Door continued ...

setting designated times to check email, and avoiding work-related messages during meals and family activities. Creating intentional limits around technology allows your brain the opportunity to disconnect and recharge.

Some cases are impossible to leave behind. A challenging surgery, an emotional euthanasia, or a difficult client interaction can be hard to process. While it's natural to reflect on these experiences, repeatedly replaying them without resolution can contribute to emotional exhaustion and compassion fatigue. In these instances, take time to debrief with a trusted colleague or team member before leaving the practice. Sharing perspectives, acknowledging emotions, and identifying lessons learned can help bring closure while preventing unnecessary rumination.

Creating healthy transitions is also a team effort. Team members should feel supported, encouraged to communicate openly, and able to ask for help after difficult days. Simple practices such as checking in with colleagues after emotionally challenging cases, recognizing accomplishments, and setting realistic end-of-day expectations are important to help veterinary teams feel supported both professionally and emotionally.

Veterinary medicine will always bring challenges that extend beyond the hospital walls, but those challenges don't have to follow you home. By creating intentional routines, setting healthy boundaries, and supporting one another through difficult days, veterinarians can make the transition from work to home more manageable. Small, consistent habits can have a significant impact, helping reduce stress, strengthen personal relationships, and build the resilience needed for a long, rewarding veterinary career.

Almost everything will work again if you unplug it for a few minutes...including you. — Anne Lamott

When The Last Carriage Leaves the Park continued ...

I write this as a veterinarian, not as a sentimentalist. I do not minimize the tragedies of this past June. A sixteen-year-old carriage horse named Deniz collapsed and died in Central Park. Days later, eighteen-year-old Romanch Mahajan died after a horse bolted and a carriage overturned. Those losses are real. They deserve investigation, accountability, and reform. What they do not automatically deserve is the conclusion that the only honest response is to erase a regulated working-animal industry from the city forever. That conclusion is now the prevailing political one. Introduction 0943 of 2026, first revived as Ryder's Law and later renamed Romanch's Law, would stop the issuance of new licenses and prohibit the operation of horse-drawn cabs after June 1, 2028. It would require what the bill calls the humane disposition of the horses and a workforce program for drivers. The Council Speaker has endorsed it. At least twenty-eight members have signed on as sponsors, more than enough to pass. The Committee on Health held its public hearing on July 15. As of late August the Council was described as nearing a final vote. No committee or stated-meeting date for that vote has yet been posted on the official calendar; the next stated meetings of the full Council are September 10 and September 24. Mayor Zohran Mamdani has not been ambiguous. He said on the campaign trail and again in office that the horse-carriage industry in our parks should end. He has pledged to sign legislation that does so, even while he presses the Council to strengthen the worker-protection language before the bill reaches City Hall. When a mayor has already committed to the signature, and when a Speaker and a majority have already committed to the vote, the destination is no longer in doubt. The only remaining questions are the date on the calendar and the wording of the transition.

When The Last Carriage Leaves the Park continued ...

What I find harder to accept is how little of the veterinary record was allowed to complicate that destination. New York City already maintains one of the most detailed regulatory schemes for working horses in the country. Carriage horses must be at least five years old to enter service and may not be licensed past the age of twenty-six. They are required to receive veterinary examinations at intervals of four to eight months, with certificates filed with the Department of Health and Mental Hygiene. Work is capped at nine hours in any twenty-four-hour period, with a mandated rest of at least fifteen minutes after every two hours. Work stops at ninety degrees Fahrenheit, or when the equine heat index reaches 150, and again at eighteen degrees in winter. Heavy winter blankets and waterproof blankets are required under specified conditions. Stalls have minimum dimensions. Bedding, water, salt, grooming, farriery, vaccination, and parasite control are all written into the code. Every twelve months a horse must receive no fewer than five weeks of furlough at a facility that provides daily paddock or pasture turnout, and proof of that furlough is a condition of license renewal. These are not suggestions. They are city law.

That framework is only as strong as the people who enforce it. For years the Department of Health's dedicated full-time equine veterinarian position—the veterinarian who once made regular rounds of the stables and the park—has sat vacant. Industry and union documents were already describing that vacancy as more than a year old in 2022. The gap has not been closed. In the meantime, private equine practitioners have carried the mandated examinations. Dr. Gabriel Cook and others have done that work with seriousness, including lameness evaluations at the trot before a certificate is signed. Their labor is not a substitute for a city veterinarian whose only client is the public interest. When an appointed oversight post is left empty for years, and when incidents then become the argument for abolition rather than for staffing the post and tightening the rules, something has gone wrong in the civic machinery. We did not fail for lack of a statute. We failed, in part, for lack of a veterinarian in the chair the statute assumed would be occupied.

There was another path on the table. Council Member James Gennaro introduced companion legislation aimed at improving conditions without extinguishing the industry: earlier morning hours in cooler weather, studies of route safety and hitching posts, and stronger practical examinations for drivers. That is the kind of incremental, evidence-based work veterinarians are trained to do. It was never given a serious hearing once the political weather changed. I understand why. Grief moves faster than a heat-index table. A bolting horse on a crowded drive is an image that no regulation can fully erase from the public mind. Still, equine veterinarians know that horses startle in every setting in which they work—on trails, in police details, in sport, in therapy barns. The professional response is training, equipment, handler protocol, and enforcement, not the claim that the species itself has become incompatible with a city that Olmsted designed around it.

I also think about the horses after the last license expires. A sudden surplus of working animals does not automatically become a field of sanctuaries. The bill's language against slaughter and against transfer into another carriage trade is necessary and welcome. It is not the same thing as a funded, veterinary-supervised retirement for every animal now on the roster. Five weeks of required pasture time each year is imperfect. It is still more structured turnout than many horses will receive if they are scattered, sold, or warehoused in the scramble that follows a hard stop. Veterinarians who have spent their careers with these animals deserved a seat at that planning table. So did the colleagues who have examined them, floated their teeth, and signed the certificates the city demanded.

When The Last Carriage Leaves the Park continued ...

I come now to the part of this column that is hardest to write, because it concerns my own organization. The Veterinary Medical Association of New York City was asked, in the months when this debate was still open, to say whether we favored or opposed the ban. We did not. The Executive Board remained paralyzed. We produced neither a statement of opposition nor a statement of support. I do not pretend that a position paper from a local veterinary association would have reversed the Council or the Mayor. It almost certainly would not have. That is not the test. The test is whether a professional body whose public purpose includes speaking for veterinary medicine, for the animals under our care, and for the colleagues who work with those animals, is willing to take a difficult position while the question is still live. We were not. I believe that was a disappointment. We could have tried to protect a lawful, inspected industry and the veterinarians attached to it. We could have insisted that the vacant city equine post be filled before anyone declared the entire system unsalvageable. We could have distinguished between mourning a child and a horse, which we must do, and concluding that mourning requires abolition, which is a separate argument. We did none of those things in public. Silence, in a moment like this, is also a position. It is simply not a useful one.

I have no interest in romanticizing an industry that has had failures, or in pretending that every horse on every hot afternoon has been a picture of ideal welfare. I have every interest in refusing the idea that veterinarians exist only to ratify whatever the loudest week of news has already decided. If this ban becomes law, it will be permanent in the way that civic erasures are permanent. No future Council is likely to reinvent a working carriage trade once the stables are gone, the medallions are retired, and the last of the old drivers have been retrained or scattered. That is why the loss is historical as well as veterinary. A city that was built, in part, by horses, and a park that was drawn for carriages, will keep the statues and lose the animals.

I hope I am wrong about the permanence. I hope the final bill, if it passes, at least funds the retirement it promises and the workforce transition it describes. I hope the Department of Health, even after the last carriage is gone, treats the vacant equine post as a lesson rather than a footnote. And I hope that the next time this Association is asked to stand up for animals, for the veterinarians who care for them, and for a regulated tradition that still had room to be made safer, we find our voice before the vote is already over.

Anthony Miele, DVM, is Treasurer of the Veterinary Medical Association of New York City. This column reflects his personal views.



Tick-Borne Disease in Dogs and Cats Diagnostic Reference

When to Consider Tick-Borne Diseases (TBDs)

- TBD signs and symptoms may be nonspecific and include fever, anorexia, and lethargy.
- Ticks emerge when snow melts and stay active until temperatures fall below freezing.
- Ticks found crawling and unattached are not considered a risk for TBD transmission.

Ticks Found in NYC

Ticks, especially blacklegged ticks (deer ticks) and Gulf Coast ticks, are found primarily on Staten Island and in parts of the Bronx.



Blacklegged ticks:
Lyme disease and anaplasmosis



Lone star ticks:
Ehrlichiosis (*Ehrlichia ewingii*), tularemia, and cytauxzoonosis (*Cytauxzoon felis*)



American dog ticks:
Babesiosis, Rocky Mountain spotted fever, and cytauxzoonosis (*C. felis*)



Brown dog ticks:
Ehrlichiosis (*E. canis*), babesiosis, Rocky Mountain spotted fever, tularemia, and hepatozoonosis (*Hepatozoon canis*)



Gulf Coast ticks:
Hepatozoonosis (*H. americanum*)



Asian longhorned ticks: Not found to carry pathogens in the U.S., but in laboratory settings can transmit *Rickettsia rickettsii* and Powassan virus and is associated with *Babesia gibsoni* abroad

Tick-borne diseases primarily seen with dogs							Tick-borne diseases primarily seen with cats	
Disease	Lyme disease	Babesiosis	Anaplasmosis	Ehrlichiosis	Rocky Mountain spotted fever	Hepatozoonosis	Tularemia	Cytauxzoonosis
Disease agent	<i>Borrelia burgdorferi</i> [*]	<i>Babesia canis</i> [†] (<i>B. canis vogeli</i> most common subspecies; rarely other <i>Babesia</i> species, including <i>B. gibsoni</i> [†])	<i>Anaplasma phagocytophilum</i> [*]	<i>Ehrlichia canis</i> [†] <i>E. ewingii</i> [*] (Rarely other <i>Ehrlichia</i> species)	<i>Rickettsia rickettsii</i> [*]	Dogs: <i>Hepatozoon americanum</i> [‡] or <i>H. canis</i> [†] Cats: <i>H. felis</i> [†] or <i>H. silvestris</i> [†] (Transmitted through ingestion of infected tick or reservoir species; information about feline hepatozoonosis is limited)	<i>Francisella tularensis</i> [*] (Animal should be isolated due to high zoonotic potential; use protective gear when handling)	<i>Cytauxzoon felis</i> [†]
Pet affected	Dogs	Dogs	Dogs; rarely cats	Dogs; rarely cats	Dogs; rarely cats	Dogs; rarely cats	Cats; rarely dogs	Cats
Disease-specific manifestations	• Most dogs have subclinical infection • New onset of malaise, joint swelling, or lameness in one or more legs • Rarely, Lyme nephritis is a complication	• Most dogs have subclinical infection, but it can cause severe illness • Hemolytic anemia • Splenomegaly • Jaundice • Bilirubinuria	• Most dogs have subclinical infection • Anemia, joint stiffness, or lameness • Moderate thrombocytopenia • Rarely severe gastrointestinal and respiratory system manifestations	<i>E. canis</i> (acute phase): • Severe thrombocytopenia, possible splenomegaly, or lymphadenopathy <i>E. canis</i> (chronic phase): • Epistaxis • Anemia or other cytopenias • Uveitis • Neurologic and renal manifestations <i>E. ewingii</i> (less severe): • Joint stiffness	• Can cause severe illness and death • Thrombocytopenia • Leukopenia • Anemia • Vascular and organ damage resulting in petechial rash and renal, hepatic, or neurologic disease	<i>H. americanum</i>: • Difficult to treat and may be fatal • Often characterized by persistent fever, gradual muscle atrophy, generalized pain, hyperesthesia, mucopurulent ocular discharge, and deterioration of body condition <i>H. canis</i> can be asymptomatic or cause mild disease	• Thrombocytopenia • Leukopenia • Anemia • Hepatosplenomegaly • Lymphadenopathy • Oral ulcers • Pneumonia	• Difficult to treat and may be fatal • Thrombocytopenia • Leukopenia • Anemia • Jaundice • Hepatomegaly and splenomegaly • Circulatory compromise leading to dyspnea and tachypnea • Bilirubinuria
Testing	• Serologic assays	• PCR • Serologic assays • Blood smear may detect parasites in erythrocytes	• PCR • Serologic assays • Blood smears to detect morulae in circulating monocytes or neutrophils	• PCR (less sensitive) • Serologic assays	• PCR (less sensitive) • Detection of organism in muscle biopsy or blood smear (detecting organism on smear is uncommon)	• PCR (less sensitive) • Detection of organism in muscle biopsy or blood smear (detecting organism on smear is uncommon)	• PCR • Serologic assays • Blood culture	• PCR • Blood smear for intraerythrocytic piroplasms • Fine needle aspiration of liver or spleen to detect schizont-laden macrophages

Molecular assays, such as PCR, detect the genetic material of a pathogen. A positive result can confirm acute infection; however, a negative result does not rule out infection, as false negatives may occur if the pathogen load is below the limit of detection.

Serologic assays detect antibodies produced in response to an infection.

- A positive result may indicate acute or past infection or cross-reactivity with similar organisms. Antibody duration varies; for IFA tests, a fourfold rise in titers between acute and convalescent samples (collected two to four weeks apart) supports acute infection. Cross-reactions can occur with similar organisms (especially spotted fever group *Rickettsia*).
- A negative suggests no infection; however, false negatives may occur, as antibodies can take up to 10 days to become detectable infections. Repeat testing if specimens are collected early and there is high suspicion for infection.

Blood smears are used to look for intracellular organisms, which may present in red and white blood cells and platelets.

Treatment Treatment is dependent on clinical manifestations and current guidelines and may include antibiotics, antiparasitics, and palliative care.
For more information, visit capcvet.org or scan the QR code.



Prevention Numerous tick bite prevention products are available and should be recommended for pets living in areas of NYC where ticks of concern are present, as well as pets that spend time in tick-endemic areas outside NYC. Additional measures include conducting tick checks and consideration of the Lyme vaccine.

^{*} Same organism that affects humans

[†] Different organism than one that affects humans

[‡] Does not affect humans

The image of the brown dog tick was provided by Jim Gathany. All other tick images were adapted from the Centers for Disease Control and Prevention.

Role of the Microbiota–Gut–Brain Axis in Behavioral and Neurologic Disorders

By Donna Raditic, DVM, DACVIM (Nutrition), CVA

This article originally appeared in [Today's Veterinary Practice](#), a peer-reviewed continuing education publication that is free for veterinary professionals. [Subscribe today](#) at no cost."

The concept of the microbiota–gut–brain axis (MGBA) stems from growing evidence highlighting the intricate communication between the microbiota, gut, and brain. The axis is bidirectional and integrates neural, endocrine, immune, and metabolic pathways. Gut microbes influence neurologic functions, cognition, and behavior, and the brain and nervous system modulate gut physiology, functions, and microbiota composition.^{1,2} Microbiota can interact with the brain via multiple routes, including gut hormone signaling, the vagus nerve, the immune system, and microbial metabolites (e.g., short-chain fatty acids, neurotransmitters, precursors).¹⁻³

In human medicine, studies have shown that gut microbiota affect cognition, mood, and overall psychological wellbeing in healthy persons as well as those with neuropsychologic and neurologic disorders.¹⁻³ Changes in gut microbiota population can lead to neurotransmitter imbalances, oxidative stress, and neuroinflammation.¹⁻³ Gut dysbiosis has been associated with anxiety, depression, autism spectrum disorders, bipolar disorder, schizophrenia, eating disorders, Parkinson disease, amyotrophic lateral sclerosis, migraines, multiple sclerosis, post-traumatic stress disorder, chronic fatigue syndrome, and epilepsy.³⁻⁶ However, the exact mechanisms are not well explored, and observed microbial changes across studies are inconsistent.

Approaches to the mental health and neurologic disorders of veterinary patients can be expanded by the valuable insights gained from the growing number of studies regarding human mental health, neurologic disorders, and the role of the MGBA. Understanding this area of research is critical, as the bidirectional nature of the MGBA implies that not only can the brain influence gut health but gut-targeted interventions may provide mental health and neuroprotective benefits.¹⁻⁶

Therapeutics that improve gut health and reestablish normal MGBA communications could be applied to veterinary patients. To date, veterinary studies of the role of the MGBA include canine behavioral disorders and neurologic diseases such as canine cognitive dysfunction syndrome (CCDS) and idiopathic epilepsy (IE).⁷

Dysbiosis and the MGBA

In healthy individuals, the microbial ecosystem is balanced. A disturbed balance can lead to a state of dysbiosis, which may be characterized by reduced bacterial diversity, depletion of beneficial bacteria, and/or proliferation of potential pathogens resulting in changes in metabolic functions.⁸ In human microbiota research, there are concerns about the different methods attempted to identify or define dysbiosis, such that some authors state there is no common definition of dysbiosis.⁹ This author acknowledges that those same concerns exist in veterinary medicine, making it difficult to compare MGBA studies. In addition, there is currently no distinct identifiable dysbiosis pattern in dogs with MGBA-associated diseases.

What is known from human and rodent studies is that health, including mental health, depends on a stable MGBA maintaining a homeostatic balance of gastrointestinal bacteria. Microbial diversity and stability are often used as key indicators of gut health, whereas decreased diversity and instability are associated with chronic disease and metabolic dysfunction.⁵⁻⁷

Stressors, especially chronic stress, increase sympathetic nervous system and hypothalamic–pituitary–adrenal axis activity that dysregulates gut functions and affects microbial ecosystem balance. Dysbiosis can also result from infections, poor diet, inactivity, environmental factors, and antibiotic use. Dysbiosis interferes with the normal MGBA by leading to dysregulated immune signaling, increased neuroinflammation, oxidative stress, and disruptions in blood–brain barrier integrity.^{2,7} The human literature indicates increasing recognition that dysbiosis is associated with a range of neurologic disorders, including developmental and neurodegenerative diseases, neuroimmune conditions, and behavioral syndromes.^{2,4,5} Recognition of the role of the MGBA in human studies strongly suggests that brain and gut microbiota may both need to be targeted to fully and effectively reverse the core signs associated with neuropsychologic, neurologic, and neurodegenerative disorders.⁵⁻⁷

Veterinary studies investigating the role of the MGBA in dogs with different behavioral phenotypes and memory demonstrate some results similar to those seen in human studies.¹⁰⁻¹⁴ Kubinyi et al assessed cognition in 29 client-owned dogs by using a memory test and analyzing fecal samples to determine whether short-term memory and age are linked to gut microbiota composition.¹⁵ In older dogs, they found a lower proportion of Fusobacteria; in dogs with better memory performance, they found fewer Actinobacteria. These results may align with studies of human Alzheimer disease that report a high abundance of Actinobacteria. A few microbiota studies comparing dogs with IE versus healthy controls reported mixed results.¹⁶⁻¹⁹ More research is needed, but evidence that the MGBA plays a role in the mental and neurologic health of veterinary patients is increasing.

MGBA-Associated Diseases and Comorbidities

Understanding the role of the MGBA in dogs with behavioral and neurologic disorders is imperative, as MGBA-associated diseases have historically been difficult to treat and manage. Veterinary patients with behavioral disorders, CCDS, and/or IE are frequently euthanized due to poor quality of life (**TABLE 1**).

In addition, MGBA diseases are often associated with comorbidities, which complicate diagnosis and therapeutics (**TABLE 2**).³² The term “comorbidity” describes the co-occurrence of 2 distinct diseases in the same individual at a rate exceeding what would be expected by chance.

Veterinary patients with MGBA disease may be presented to the general practitioner with a primary complaint describing a behavioral disorder (e.g., anxiety, noise phobia). Dogs with MGBA disease can also exhibit recurring or chronic gastrointestinal issues. Studies suggest that 20% to 30% of companion animal visits to veterinarians are for vomiting or diarrhea or both.³³ To determine if these patients have MGBA-associated diseases, the general practitioner will need to obtain a thorough history to evaluate both mental and gastrointestinal health. For the patient with behavioral concerns, questions about gastrointestinal health (e.g., appetite, stool quality) should be investigated. For the patient with common and/or uncommon gastrointestinal signs, the patient’s mental health should be assessed.³⁴

TABLE 1 MGBA-Associated Diseases

MGBA-ASSOCIATED DISEASE	MEDIAN SURVIVAL AFTER DIAGNOSIS	PRIMARY CAUSE OF DEATH	OUTCOMES WITH MANAGEMENT	NEGATIVE PROGNOSTIC FACTORS
Idiopathic epilepsy	~ 5.5 yr after index episode ²⁰	Euthanasia (52% epilepsy-related) ²⁰	~ 40% seizure freedom; 64.5% to ≥ 50% reduction ²¹⁻²³	Cluster seizures, status epilepticus, neutered male, certain breeds ^{20-22,24}
Behavioral disorders	Variable; lifelong management needed ^{25,26}	Euthanasia or relinquishment ²⁵⁻²⁷	Most improve; none “cured” ^{25,28}	Human-directed aggression, owner capacity, delayed intervention ^{25,26,28}
Canine cognitive dysfunction syndrome	Does not shorten lifespan ^{29,30}	Euthanasia for quality of life (within 2 yr if severe) ³¹	77% improve on selegiline ³¹	Severity at diagnosis, absence of early intervention ^{30,31}

MGBA = microbiota–gut–brain axis

TABLE 2 Potential MGBA Disease Comorbidities in Veterinary Medicine

PRIMARY DISEASES AND COMORBIDITIES	EXAMPLE
Behavioral disorder	
CIE	CIE and separation-related behavior
Other gastrointestinal disorders	Gastric reflux and excessive licking of surfaces
Idiopathic epilepsy	
Behavioral disorders	IE and aggressive behavior
CCDS	IE in a 6-year-old dog with moderate CCDS

CCDS = canine cognitive dysfunction syndrome; CIE = chronic inflammatory enteropathy; IE = idiopathic epilepsy; MGBA = microbiota–gut–brain axis.

In the author’s clinical experience, clients easily and frequently report changes in characteristics such as stools and appetite but often do not realize that their dog has underlying concurrent behavioral disorders. Due to the frequency of the comorbidities of gastrointestinal diseases and behavioral disorders, the author now investigates the mental health of all patients with recurring or chronic gastrointestinal signs. If the patient is found to have gastrointestinal signs and behavioral disorders, the diagnosis is MGBA-associated disease with both gut and brain dysfunction. It is strongly recommended that the MGBA disease diagnosis be discussed with the client, as these patients are often not cured; management involves addressing both the behavioral disorder and the gastrointestinal concerns.

Studies have revealed that dogs with IE often have concurrent behavioral disorders and/or early-onset CCDS.^{32,35-38} Belén et al defined such IE patients as having “neurobehavioral comorbidities” to emphasize the challenges of management.³² IE may initially be seen as an emergency situation, but the general practitioner should be aware of and carefully evaluate these patients for behavioral and/or CCDS comorbidities as part of their management. CCDS, a translational model for human Alzheimer disease, is diagnosed by exclusion, as advancing age is associated with changes in all body systems and many disease states can contribute to the behavioral changes indicated by the DISHAA tool (a canine cognitive dysfunction syndrome rating scale, with categories of **Disorientation**; **social Interactions**; **Sleep–wake cycles**; **House soiling**, learning, and memory; **Activity**; and **Anxiety**).³⁹ Saral et al evaluated a small group of senior dogs in an exploratory study by using physiologic indicators and microbiota profiling integrated with pain evaluation and cognitive testing.⁴⁰ Preliminary findings highlighted potential interactions between pain, microbiota composition, and immune dysregulation.⁴⁰

Proper diagnosis and management of patients with MGBA diseases with comorbidities can be challenging. General practitioners may want to consider consulting with or referral to veterinary specialists (e.g., internists, nutritionists, neurologists) applicable for patients with more advanced MGBA diseases.

Behavioral Disorders and Gastrointestinal Diseases

According to a recent consensus, chronic inflammatory enteropathy (CIE) describes a group of gastrointestinal disorders with persistent or recurrent gastrointestinal signs and variable mucosal inflammation.³³ The consensus states that the pathogenesis in dogs is complex and can be driven by genetics, immunology, environmental factors, and gastrointestinal luminal components.³³ The consensus does not clearly acknowledge the MGBA except for mention of “behavioral biomarkers” (e.g., detection of discomfort based on behavioral cues) as being a potential predictor for relapse.³³

It has been this author’s clinical experience that many patients with CIE have concurrent behavioral disorders. In a cross-sectional, case-control, questionnaire-based study, Ludvigsson et al evaluated 50 dogs with CIE and 50 matched healthy dogs.⁴¹ The researchers’ clinical impression was that dogs with CIE, both treatment naïve and receiving treatment, can experience emotional compromise. By assessing gastrointestinal disease activity scoring and emotional health, the researchers found that mean negative activation score was higher among dogs with CIE than among healthy dogs, which indicated a more negative emotional predisposition. The dogs with CIE reportedly more often performed displacement behaviors corresponding with “sometimes” to “often,” indicative of higher emotional arousal compared with healthy dogs. The owners of dogs with CIE more often reported agreement with scores ≥ 3 on statements regarding signs of distress when they prepared to leave their dog alone. All of these findings were considered indicative of a relationship between CIE and compromised emotional health. It is also noteworthy that the CIE dogs in the study had low gastrointestinal disease activity scores yet still demonstrated compromised emotional health.⁴¹ The results clearly support the researchers’ and this author’s clinical impression that there is a strong relationship between CIE and signs consistent with compromised emotional health (e.g., behavioral disorders).

Another retrospective study looking at the relationship between behavior and gastrointestinal disease evaluated 24 client-owned dogs at a behavioral medicine service and referred to an internal medicine service for management of chronic gastrointestinal signs.⁴² Nineteen dogs received multimodal behavioral (e.g., environmental management, behavior medications, training techniques, behavior modification, safety equipment) and gastrointestinal (e.g., diet modification, fiber supplementation, probiotics, fecal transplantation) treatments. Clinical improvement in both areas after comanagement for behaviors and chronic gastrointestinal signs was noted for 76% (13/17).⁴²

The MGBA and Uncommon Behavioral Signs of Gastrointestinal Disease

Behavioral signs of gastrointestinal disease, which are not as obvious, include abnormal appetite (e.g., pica), foreign body ingestion, and excessive licking.³⁴ Pica has been described as a nonspecific sign of potential nutrient deficiencies and neurologic conditions; however, a recent retrospective study suggested that pica may be a clinical sign of chronic gastroenteritis.⁴³ Another study of dogs requiring surgical foreign body removal reported that the dogs had concurrent behavioral disorders, including anxiety, fear, or impulsive behavioral disorders.⁴⁴

Excessive licking includes air licking, obsessive repetitive surface licking, and excessive grooming. Frank et al evaluated 7 dogs for “fly biting” (a behavior previously categorized as hallucinatory, locomotory, or

oral/obsessive compulsive) and found that most of the dogs had underlying gastrointestinal disease.⁴⁵ Similarly, “star gazing” by a Yorkshire terrier was linked to reflux and esophagitis; signs resolved after appropriate gastrointestinal treatment.⁴⁶ In another study of excessive surface licking, it was noted that 14 out of 19 dogs had gastrointestinal abnormalities, leading the authors to recommend considering gastrointestinal disorders in the differential diagnosis of dogs that exhibit excessive licking of surfaces.⁴⁷

An array of behavioral disorders can arise, increase, or be exacerbated by chronic gastrointestinal pain. The behavioral comorbidities associated with chronic gastrointestinal pain may include self-protective aggression, noise sensitivities, stress displacement, inhibition of learning and performance, anxiety, stress-displacement behaviors (e.g., destruction, urine marking, abnormal repetitive behaviors), resource guarding, and/or separation-associated distress.³⁴

Functional gastrointestinal disorders comprise a complex condition in human gastroenterology characterized by abdominal discomfort; epigastric pain; postprandial fullness; or early satiety in the absence of organic, metabolic, or systemic causes. Kaufmann et al retrospectively evaluated 29 dogs with dyspepsia that they classified as a functional gastrointestinal disorder.⁴⁸ They reported that functional dyspepsia is an emerging functional gastrointestinal disorder characterized by chronic gastrointestinal discomfort and vomiting in the absence of confirmed organic disease seen especially in toy- and small-breed, middle-aged, female dogs. They suggested that functional dyspepsia could potentially be an MGBA disturbance requiring multimodal therapy.

Another functional gastrointestinal disorder is irritable bowel syndrome (IBS), a well-known gastrointestinal concern for humans, associated with chronic signs but no associated structural or biochemical disorder. It has been reported that human patients with IBS experience high rates of anxiety and depression. In veterinary patients, IBS, defined as recurrent gastrointestinal signs (e.g., vomiting, diarrhea, constipation) with abdominal bloating and visceral pain with no histologic inflammation, has been reported and may be another MGBA disease; however, no studies have evaluated IBS patients for behavioral disorders.³⁴

This author’s clinical experience has been that when a client describes unusual or suspect behavior(s) of gastrointestinal or gastrointestinal-like signs, it is useful to have them document those events on video for the general practitioner to review. Clients’ verbal descriptions of the events may not be enough for the practitioner to determine if the behaviors are truly normal or are abnormal and associated with gastrointestinal disease. It is also useful to know if those events tend to be associated with stress or potential changes in routines, thereby suggesting a potential MGBA-associated disease.

MGBA-Associated Diseases and Potential Therapeutics

In veterinary medicine, behavioral disorders are treated with protocols that use conditioning techniques to create new emotional and behavioral patterns integrated with environmental management. Psychoactive medications may be used to adjust the chemical mediators of fear-related states. For patients with IE, anticonvulsants are often prescribed. For patients with CCDS, selegiline, also known as l-deprenyl, is currently the only FDA-approved drug for treatment. Behavior modification and drugs are usually considered as therapies for the brain, although drugs may either directly or indirectly affect the gut microbiota.

Numerous reviews and systematic analyses of rodents and human mental health research have evaluated the effects of prebiotics, probiotics, synbiotics, and postbiotics as dietary supplements and fecal microbiota transplantation (FMT).⁴⁻⁶ Dietary supplements and FMT would be considered gut and microbiota

treatments. Studies of rodents and humans have shown some positive results in terms of improving behavioral and neurologic disorders after microbiota modulation using dietary supplements and FMT.⁴⁻⁶ The Saco et al review of the few relevant studies of canine anxiety concluded that use of these dietary supplements was promising; however, more research is needed.⁴⁹

Four studies have evaluated FMT and the MGBA in dogs.⁵⁰⁻⁵³ Two studies evaluating the use of FMT in dogs with CIE reported that owners noticed increased activity and perceived improved quality of life (i.e., playfulness, social interactions, enjoying longer walks).^{50,51} Stated reasons for the increases included “alterations in gut-brain axis”; however, placebo effect or decreases in corticosteroids and inflammation could not be ruled out.^{50,51} Noting that intestinal microbes directly and indirectly synthesize neurotransmitters including γ -aminobutyric acid, noradrenaline, dopamine, and serotonin, the authors stated that further investigation of their study population would include metagenomic sequencing and metabolomic analysis before and after FMT.⁵⁰ A study of 9 dogs with drug-resistant IE and comorbid attention-deficit/hyperactivity disorder–like, anxiety-like, and fear behaviors underwent 3 colonic FMTs administered 2 weeks apart.⁵² Overall, improved behavior and quality of life was reported for all dogs and a 50% reduction in seizure cluster days for 4 dogs. Another study compared the effects of saline with oral FMT over 14 days in 20 wolf cyan police dogs.⁵³ The dogs were subjected to 1 hour of road transportation and evaluated for serum stress indicators.⁵³ FMT appeared to reduce the diarrhea rate and stress indicators.⁵³ Other dietary supplements containing nutrients and/or botanicals are marketed as targeting behavioral disorders, but for many, research is limited or nonexistent.^{54,55}

Diet and MGBA-Associated Disease Management

Whole diet can have a tremendous effect on microbiota and host health. Numerous studies and review publications highlight factors such as macronutrient balance, food format, and functional ingredients and their effects on microbial diversity, metabolism, and function.^{4-6,56,57} Diet modification is a clinically actionable tool needed for patients with MGBA diseases; however, selecting which specific diet to use is often a trial-and-error process. According to a consensus on diet therapy for CIE, several diet types can be effective, but multiple trials using different diet categories are often needed.³³ Because CIE is food responsive in about 70% of affected dogs, performing a minimum of 3 trials before adding drugs is recommended. The recommended diets are veterinary therapeutic diets—hydrolyzed, novel protein, and gastrointestinal—and homemade diets formulated by a board-certified veterinary nutritionist.³² Because of the likelihood of comorbidity of behavioral disorders and gastrointestinal diseases (e.g., dogs with CIE and behavioral disorders), it is logical and recommended that general practitioners use veterinary therapeutic diets or nutritionist-formulated homemade diets for patients with MGBA diseases.

For dogs with IE, studies evaluating medium-chain triglyceride (MCT)–enriched diets have been conducted; results led to some decreased seizure frequency and reduced behavioral comorbidities.⁵⁸ Although MCT-enriched diets are often considered ketogenic in dogs, the mechanism benefits for epilepsy symptom control are not entirely understood.⁵⁸ Diet studies among patients with CCDS have also focused on MCT-enriched diets, but omega-3 fatty acids and antioxidants have also been considered beneficial.⁵⁹ After reviewing scientific literature and clinical experience, this author uses formulated homemade diets, veterinary therapeutic diets, or a combination of homemade and veterinary therapeutic diets along with a specific list of human foods as treats. The veterinary therapeutic diets Purina Pro Plan Veterinary Diets NC NeuroCare dry dog food and Hill’s Prescription Diet Brain Care + j/d dog food can be considered for IE and CCDS, respectively.

MGBA-Associated Disease Management

For patients with CIE, this author always asks the client about the patient's mental health, having learned that when a patient has both CIE and mental health issues, the best approach is to manage both conditions simultaneously. If the behavioral component is severe, the client is strongly encouraged to work with a veterinary behaviorist for appropriate medical and behavioral modifications. For milder cases, the client is directed to other sources for behavior treatments and plans. In the author's clinical experience, such patients are not "cured," but targeted MGBA management (i.e., concurrent treatment of both the CIE and behavior) can reduce frequency and intensity of CIE episodes and/or behavioral issues. The best outcomes tend to be for younger patients that have dedicated owners and that receive earlier interventions involving nutrition, appropriate behavior modifications, and medications.

The management approach used by the author is like that of a food allergy trial, in which the patient is allowed only the selected diet and specific treats, eliminating any other food sources such as treats, chews, supplements (unless prescribed), flavored medications, and preventives. The strict food allergy concept reinforces client education about the role of the MGBA and allows for evaluation of the selected diet and specific treats affecting the patient's microbiota. Although trial and error in diet selection may be needed, the client is told that strict adherence to the nutrition plan often decreases the number of diet trials and reduces the time needed to obtain positive results.

Clients are asked to record the patient's gastrointestinal signs (e.g., fecal score, gastrointestinal events, appetite, body weight, body condition score, muscle condition score) as well as the prominent signs of the patient's behavioral disorder (**CASE EXAMPLE**). Creating simple daily scoring systems for both gastrointestinal signs and behavior that can be recorded, tabulated, and trended will enable the general practitioner to determine the effectiveness of concurrent treatments.

During management (and preferably lifelong), only 1 change at a time is recommended. For example, if a change in drug therapy is needed, no changes are made to the nutrition plan until sufficient time has passed to assess the response to the new medications. Similarly, if a diet change is needed, it is implemented without altering medications so that the effects of the new diet on the patient's CIE and behavioral signs can be accurately assessed. Clients should also be provided with "rescue" medications and nutritional adjustments for inevitable setbacks, such as episodes of loose stools or excessive behavioral responses.

Over time, maintaining logs of numerically assessed gastrointestinal and behavioral signs may help clients anticipate issues, enabling them to avoid triggering events or make preemptive changes to medications, nutrition, or behavior plans. The log will guide the general practitioner and client in managing the patient for improved health and quality of life.

Summary

Studies indicate that behavioral disorders, IE, and CCDS in dogs should be considered as diseases associated with abnormalities in the MGBA. MGBA diseases are often associated with comorbidities that make diagnosis difficult, management lifelong, and prognosis poor. Understanding MGBA diseases helps practitioners improve outcomes and educate clients. Client compliance and involvement are paramount to improving quality of life for patients with MGBA diseases. Further research involving MGBA diseases is needed to increase awareness and understanding and develop reliable and successful medical and dietary approaches for patients with these diseases.

CASE EXAMPLE

Microbiota–Gut–Brain Axis–Associated Disease Management in a Poodle

Signalment and History

Bliss was a 3-year-old intact male miniature poodle referred for a telemedicine nutrition consultation for recurrent bouts of inappetence and weight loss. His body weight at presentation was 6.27 kg (13.8 lb) and his body condition score (BCS) was 3/9. An internist diagnosed lymphoplasmacytic chronic inflammatory enteropathy, and a behaviorist was treating generalized anxiety disorder and noise phobias.

The client described the gastrointestinal events as starting with refusing food and water and repeated burping. Bliss would eventually experience bilious vomiting and/or loose stool with blood and mucus. A severe flare resulted in total anorexia, reluctance to drink from a bowl, liquid diarrhea, and weight loss.

Client Concerns and Treatment Goals

The client was feeding Bliss multiple times a day, either an unbalanced homemade diet or a canned veterinary therapeutic gastrointestinal low-fat diet with multiple supplements; results were poor. The client reported that the multiple feedings were not sustainable and that in the next couple of years she and her family were moving to France. Treatment goals were to develop a nutrition and behavior treatment plan that would eliminate or at least minimize gastrointestinal events and improve behavioral disorders.

Treatment Protocol

The behaviorist's current treatment plan included daily medications (buspirone 7.5 mg q12h and gabapentin 25 mg q12h), rescue medications (alprazolam 1 mg 1/4 tablet 2 hours before stressful

events), 50 mg of gabapentin before going for grooming, and dexmedetomidine oromucosal gel [Sileo, Zoetis] 30 minutes before thunderstorms), and desensitization programs.

The nutritionist discussed with the client and shared with the behaviorist a nutrition plan to include the following:

- Information about diet trials to find a diet, feeding schedule, and rescue programs that are sustainable and minimize gastrointestinal events to stabilize appetite, water intake, body weight, BCS, and muscle condition score
- The client was instructed that, because Bliss had historically lost weight with the recurrent gastrointestinal events, maintaining a BCS of 6/9 would be acceptable and preferred.
- High-value treats for desensitization programs
- Supplements, particularly Visbiome Vet (ExeGi Pharma), 1 capsule q24h
- Client education about the role of the microbiota–gut–brain axis and value of using a food allergy approach to minimize number of diet trials
- Value of implementing only 1 change at a time with nutrition plan and behavior medications
- Daily monitoring of gastrointestinal and behavioral events
 - The client was encouraged to create her own monitoring system with numerical scoring of both gastrointestinal and behavior events that would reflect her observations and work with her schedule (**BOX A**). The monitoring system would be shared with the referring general practitioner, nutritionist, and behaviorist.

BOX A

Client-Created Monitoring System

Behavior

- **Licking surfaces**
 - **1** - Obsessive licking after all meals
 - **3** - Obsessive licking at night
 - **5** - No licking, resting easy after meals
- **Vocalizations**
 - **1** - Whining and barking after meals
 - **3** - Whining and barking after last meal
 - **5** - Quiet and resting after meals
- **Bravery**
 - **1** - Staying within 3 feet of me for backyard walk
 - **3** - Waiting for me to go outside
 - **5** - Going in dog yard while I stay by the door

Gastrointestinal

- **Appetite**
 - **1** - Refusing meals
 - **3** - Fussy to eat all meals
 - **5** - Eating all meals independently
- **Drinking**
 - **1** - Choking after drinking
 - **3** - Afraid/refusing to drink out of bowls
 - **5** - Drinking out of dog bowls
- **Stools**
 - **1** - Liquid
 - **3** - Some soft, some normal
 - **5** - All normal

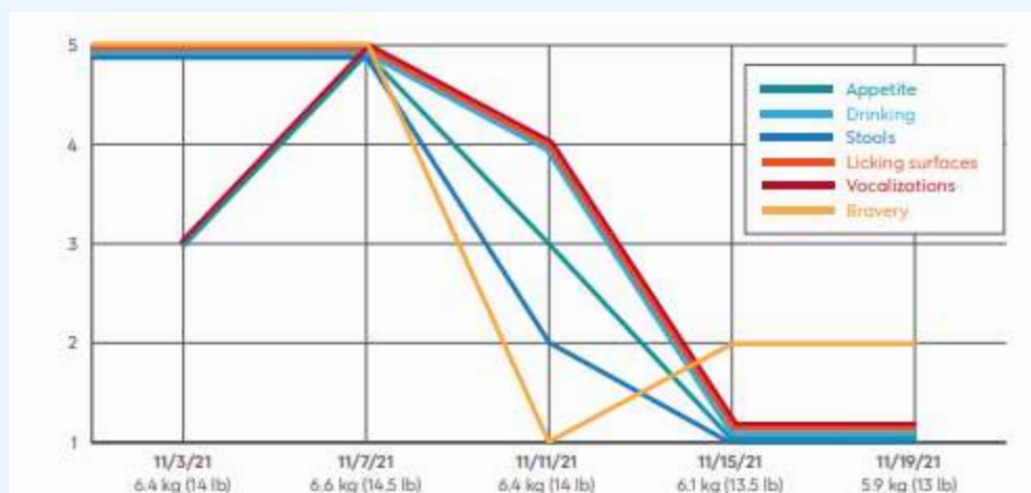


FIGURE A. Decreasing gastrointestinal and behavior scores of patient after being fed a homemade diet.*

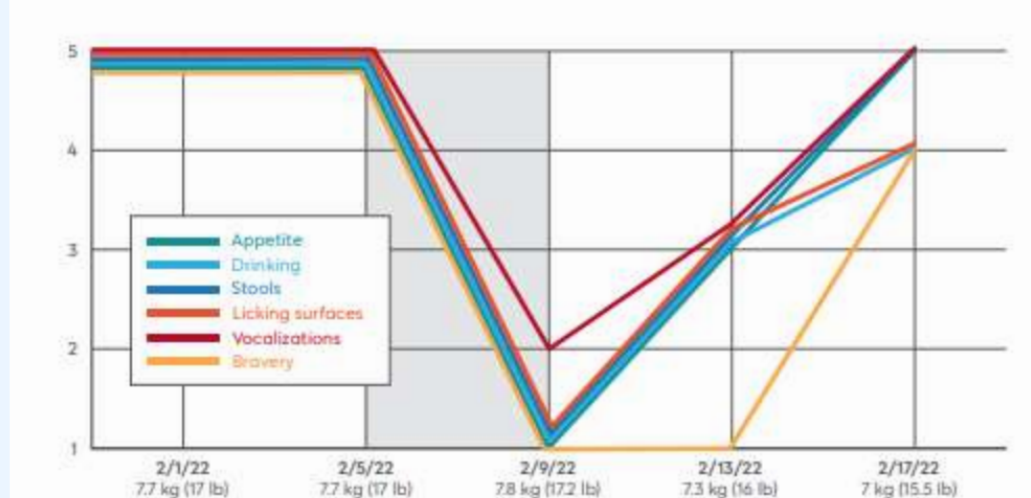


FIGURE B. Gastrointestinal and behavior scores of patient being fed a hydrolyzed dry diet. The decrease in scores resulted from a stressful grooming event (gray).*

*Line positions have been adjusted slightly to improve visual clarity. These adjustments do not alter the underlying data, trends, or interpretation of the results.

Monitoring and Outcome

The nutritionist provided a homemade recipe for the first trial diet. On 11/3/21, Bliss was fully transitioned onto the homemade diet and the client reported that Bliss had improved with a better appetite and weight gain. However, during the next 2 weeks it was clear from the monitoring scores that his gastrointestinal and behavioral parameters were deteriorating and he was once again losing weight (**FIGURE A**).

The nutritionist then transitioned Bliss to a hydrolyzed dry diet, which, over months, stabilized his gastrointestinal and behavior scores.

Over time, it became evident Bliss's behavior scores often declined before a gastrointestinal episode. That information was used to perfect behavior and gastrointestinal rescue plans that the client could institute when she noted a decline in behavior scores. The client also learned to avoid or modify certain situations that affected Bliss's emotional stability. For example, the client noted a sudden deterioration in both behavior and gastrointestinal scores on and after Bliss's grooming day on 2/5/22 (**FIGURE B**). Bliss had been given his prescribed behavior modification medications for the appointment, but his usual groomer was not available. The client felt Bliss was reasonably stable, so she agreed to leave him for his appointment with the different groomer. Despite instituting rescue therapies, Bliss's behavior and gastrointestinal scores deteriorated for approximately the next 6 days until he stabilized. From this recorded event, the client always made sure Bliss's usual groomer was there for his scheduled appointments.

After 3 years of monitoring and consulting with this veterinary team, Bliss and his family moved to France. At the time of this publication, Bliss is still being fed his hydrolyzed diet, receiving behavior medications, and has a good quality of life, according to the client.

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