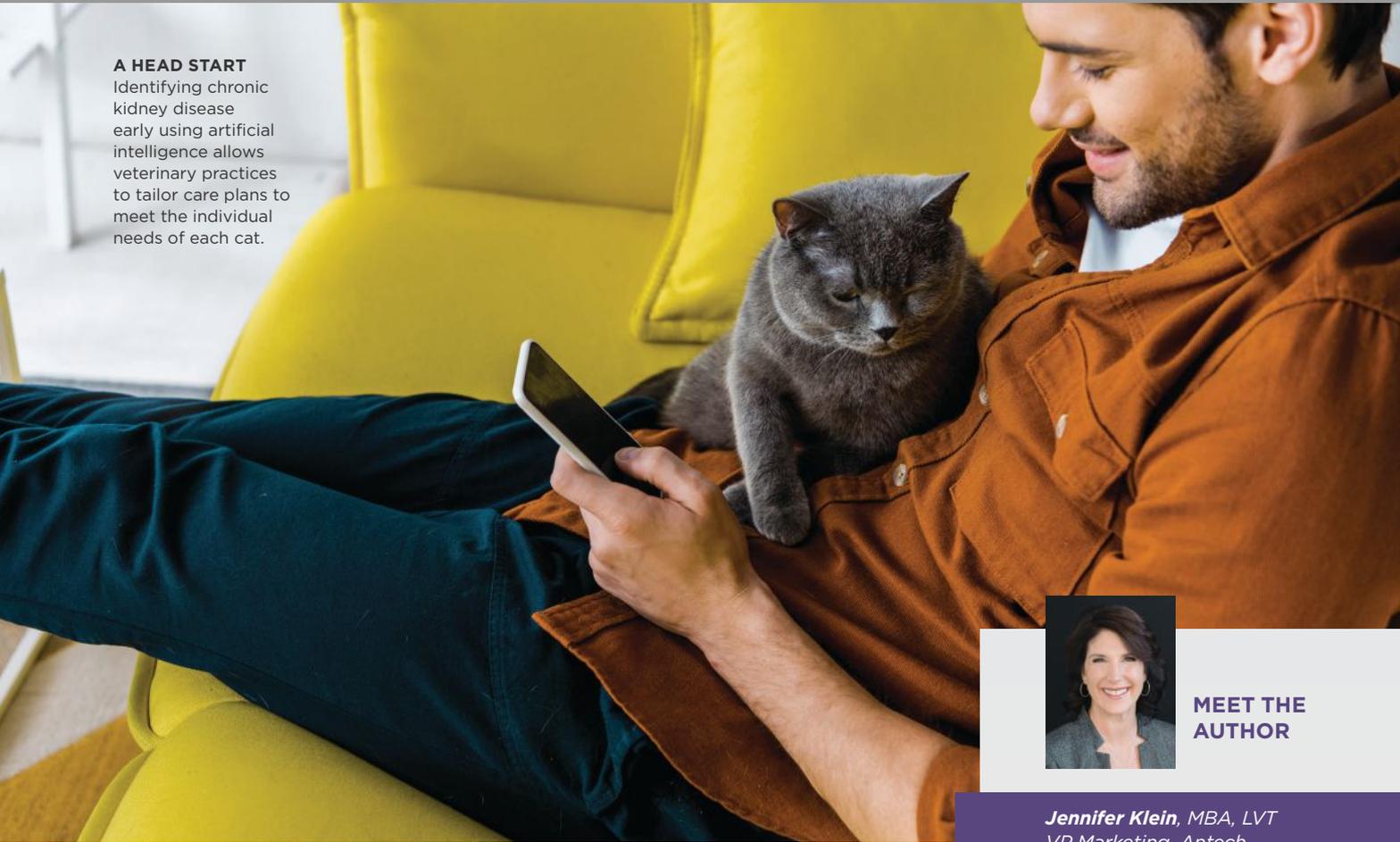




A HEAD START

Identifying chronic kidney disease early using artificial intelligence allows veterinary practices to tailor care plans to meet the individual needs of each cat.



MEET THE AUTHOR

Jennifer Klein, MBA, LVT
VP Marketing, Antech Diagnostics

Predictive Power

Supporting pet owners after they receive a disappointing diagnosis is often an essential part of a veterinary nurse's job. When a veterinarian leaves the exam room, human eyes often turn to the veterinary nurse, seeking perspective, guidance, and, sometimes, comfort. When a diagnosis is grim, meeting these gazes with anything but sad resignation is challenging.

Jen began her career as a licensed veterinary technician in southern Maine. After a productive career as a small animal LVT, she joined the corporate side of animal health, working for 25+ years in various roles including operations, R&D, product design, development, and marketing. After 21 years with IDEXX, she ran her own consulting business for several years before joining Antech as vice president of marketing and corporate affairs. Jen has had many pets over the years, including a rescue sonoran gopher snake, and is currently searching for the perfect addition to her pet family after recently saying goodbye to her rescue basset hound, MonaB.

LightField Studios/shutterstock.com

Chronic kidney disease (CKD) is a diagnosis that often elicits that look. It's a common diagnosis for cats, affecting 30% to 40% of cats over the age of 10.¹ While early care strategies continue to increase, disease is often detected too late for them to have a meaningful impact. As it stands, just 48% of cats in the U.S. receive regular veterinary care.² Even if they visit annually—or, for cats aged 7 years and older, semi-annually, as recommended by the American Animal Hospital Association—the standard diagnostic for CKD, serum creatinine, usually finds disease only once 75% of kidney function is lost.³ At that point, early care strategies are only marginally effective. The cat's outlook is usually grim.

As technology continues to evolve, however, the outlook for diagnoses that were once dire also improves, changing the way veterinary nurses support pet owners. Where feline CKD is concerned, recent technologic advances and new International Renal Interest Society (IRIS, iris-kidney.com) guidelines suggest the outlook is changing. This article reviews these advances, offering guidance for the changing role of veterinary nurses as they encourage pet owner commitment to a care plan that will improve and potentially extend a cat's life.

AI COMES TO VETERINARY MEDICINE

The ability to conduct deep analysis of data too vast for the human mind, detect patterns and trends, and learn from these discoveries has established artificial intelligence (AI) as one of the most astounding creations of our time. Almost daily, AI and machine learning unearth new ways to diagnose, treat, and even predict human disease, promising earlier, more precise care, and ultimately, better quality of life and longevity.

In animal health, AI is doing the same. Through deep analysis of large sets of health data collected as part of routine diagnostics, veterinary researchers have been able to develop predictive diagnostic tools.

“You can, at an earlier stage in the life cycle of the disease or pathology, identify things that are going to happen in the future, and that's the most important benefit,” says Aaron Masecar, assistant director of the Translational Medicine Institute at Colorado State University. “In 6 months, there's going to be 'x' problem, and we have the biomarkers that have given us an indication of this, so let's start doing something about it, let's start treating it, let's start engaging in



She thanks you

For prescribing NexGuard® (afoxolaner) for its savory beef flavor.

- The only **flea & tick control** product indicated for the prevention of **Borrelia burgdorferi** infections as a result of killing black-legged ticks
- **Gentle protection** in a bite-sized monthly dose
- **Proven safety** for puppies as young as 8 weeks, weighing 4 pounds or more
- The **savory beef-flavored chew** that makes compliance a treat

NexGuard®
(afoxolaner) Chewables

IMPORTANT SAFETY INFORMATION: *NexGuard* is for use in dogs only. The most frequently reported adverse reactions include vomiting, pruritus, lethargy, diarrhea and lack of appetite. The safe use of *NexGuard* in pregnant, breeding, or lactating dogs has not been evaluated. Use with caution in dogs with a history of seizures or neurologic disorders. For more information, see the full prescribing information or visit NexGuardClinic.com.

NexGuard® is a registered trademark of the Boehringer Ingelheim Group. ©2020 Boehringer Ingelheim Animal Health USA Inc., Duluth, GA. All rights reserved. US-PET-0253-2020-B





preventive care so that the acute onset is not going to be as traumatic.”

One of these new predictive diagnostic tools can predict whether a cat will develop CKD within the following 2 years. Published data shows the tool, called RenalTech™ (Antech Diagnostics, antechdiagnostics.com), can make these predictions with greater than 95% accuracy.⁴

PREDICTING DISEASE: WHEN SCIENCE FICTION BECOMES REALITY

Now that AI gives us the opportunity to predict and treat disease before it happens, veterinary teams can act early. RenalTech combines the anonymized medical data from 150,000 cats over 20 years with sophisticated AI learning. It analyzes 6 routine analytes—creatinine, blood urea nitrogen, urine specific gravity, urine protein, urine pH, and white blood cells—along with a cat’s approximate age to deliver a RenalTech status; most cats fall into a “yes” or “no” bucket. Significantly, there’s no extra work on the part of the practice as these data are collected as part of a minimum database that’s usually a part of an annual exam. A cat’s RenalTech status appears automatically at the top of the lab report along with the results of a minimum database.

“A growing body of data suggests that early care strategies can impact cats with chronic kidney disease, potentially delaying what would otherwise be the natural progression of CKD,” says Dennis J. Chew, DVM, DACVIM. “A warning for a future diagnosis of CKD provides an opportunity for veterinarians and pet owners to act proactively instead of reactively with further diagnostics and early care strategies.”

A SPRINGBOARD FOR IMPROVING FELINE HEALTH

The opportunity to predict disease and treat it before it occurs arms veterinary nurses with a tangible way to inspire pet-owner compliance with highly personalized care plans designed to delay disease onset. Veterinary nurses play a critical role in ensuring pet owners follow these plans to keep their pets healthy and ensure their longevity. Complementing disease prediction is symmetric dimethylarginine (SDMA). SDMA is a biomarker for kidney function in dogs and cats. It signals when, on average, 40% of kidney function is lost versus creatinine, which increases above reference intervals only when significant loss of function has occurred (75%). Identifying CKD early allows veterinary practices to tailor care plans to meet the individual needs of each cat. Once disease is underway, SDMA helps practices monitor and stage disease according to updated IRIS guidelines, once again adjusting care plans to specific disease progress. Veterinary nurses now have a complete renal toolkit for helping pet owners understand the critical role they play in their cat’s good health.

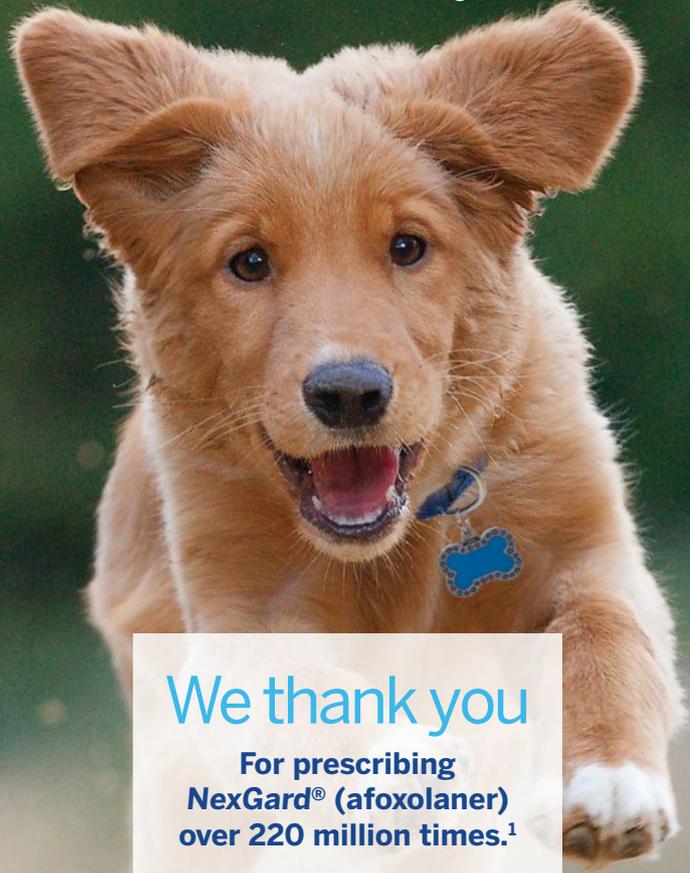
CHANGING THE OUTLOOK FOR CATS WITH CKD

Technology advances that allow veterinary teams to predict disease before it happens, detect it earlier once it does, and track its progression over time fundamentally change the way veterinary teams manage CKD cats.

“Traditionally, the cat is diagnosed when the owner notices their cat isn’t doing well and takes it to the vet,” says Kay O’Donnell, vice president of Waltham Petcare

TABLE 1 Phase 1: Pre-disease

RENALTECH RESULT	DIAGNOSIS	TALKING POINTS
RenalTech Positive	A cat will develop CKD within the next 24 months (or a patient already has CKD).	<ul style="list-style-type: none"> ● Counsel pet owner to repeat a minimum database within the next 3, 6, or 12 months (based on age and health status). Explain that they will need to recheck their cat’s status every 3–6 months thereafter to evaluate CKD progression.
RenalTech Negative	A cat will not develop CKD within the next 24 months.	<ul style="list-style-type: none"> ● Celebrate the news and affirm the high confidence (>95%) associated with a negative result. ● Counsel pet owner to return for a repeat minimum database as recommended by the veterinarian (usually 3, 6, or 12 months depending on age and health status).
RenalTech Inconclusive	Additional data required to report positive or negative status with statistical certainty.	<ul style="list-style-type: none"> ● Explain that RenalTech needs a baseline from which to make an accurate prediction. ● Counsel pet owners to return in 3–6 months for a complete blood count, biochemical profile, and urinalysis.



Science Institute. “By the time [CKD] has become noticeable, the cat is in trouble. Between 40% and 70% of kidney function can be lost. The advantage to RenalTech is that you can pick it up much earlier. It gives us a chance to change the outcome.”

CKD is no longer a dire diagnosis if it is caught early enough for IRIS-recommended early care strategies to work or be employed even before disease takes hold. In this new world, the significance of veterinary nurses as both educators and counselors throughout a cat’s life can’t be overstated. Encouraging pet owners to follow new care guidelines is critical to cats reaping all the benefits that these technology advancements offer. Here are some tips that can help:

1. Evangelize the importance of routine wellness exams

The fact remains: cats just don’t visit veterinarians as often as dogs. Part of the job of a veterinary nurse is to help cat owners understand and accept the need for regular, preventive care that matches a cat’s stage of life, noting that care requirements increase as a cat ages. If a cat is diagnosed with CKD, is RenalTech Positive, or RenalTech Inconclusive, it is even more critical that they visit the vet according to their new care plan. Encourage pet owners to schedule their next few visits before they leave to ensure cats receive the care they need.

2. Make technology relatable

AI is more a part of our everyday lives than we may be aware. Pet owners may have used Waze to get to their appointment. They may have listened to Pandora in the car. All of these are examples of how we use AI to make our lives better, more efficient, and easier. The same is true for AI in diagnostics: AI helps veterinarians elevate the care they provide to pets. It helps them deliver more precise diagnoses and in some cases, predict disease. Encourage pet owners to recognize the value AI has in all of our lives, introducing the opportunity for it to change the way we treat CKD. Foreseeing disease before it happens offers unprecedented opportunity to act proactively, not reactively. In a sense, veterinary nurses become cheerleaders for change—change that has vast potential to keep cats healthy, longer.

● Explain the value of each data point along the care pathway

Together, RenalTech and SDMA offer a new level of insight into a cat’s health. See **TABLE 1** for some tips for helping pet owners recognize their role at each new milestone.

We thank you

For prescribing
NexGard® (afoxolaner)
over 220 million times.¹

- The only **flea & tick control** product indicated for the prevention of **Borrelia burgdorferi** infections as a result of killing black-legged ticks
- **Gentle protection** in a bite-sized monthly dose
- **Proven safety** for puppies as young as 8 weeks, weighing 4 pounds or more
- The **savory beef-flavored chew** that makes compliance a treat

NexGard®
(afoxolaner) Chewables

IMPORTANT SAFETY INFORMATION: *NexGard* is for use in dogs only. The most frequently reported adverse reactions include vomiting, pruritus, lethargy, diarrhea and lack of appetite. The safe use of *NexGard* in pregnant, breeding, or lactating dogs has not been evaluated. Use with caution in dogs with a history of seizures or neurologic disorders. For more information, see the full prescribing information or visit NexGardClinic.com.

1. Data on file at Boehringer Ingelheim.

NexGard® is a registered trademark of the Boehringer Ingelheim Group. ©2020 Boehringer Ingelheim Animal Health USA Inc., Duluth, GA. All rights reserved. US-PET-0253-2020-C





Once a cat has been diagnosed with CKD, pet owners will find guidance especially helpful as care plans evolve in accordance with a cat's disease progression. Understanding disease staging can be complex; accommodating care plan changes will require additional support at home as well as during veterinary visits. Follow criteria in the IRIS guidelines for diagnosing, staging, and treating stages 1 through 4 of CKD (**TABLE 2**).

A BRIGHTER FUTURE FOR CKD CATS

The combination of vast data, machine learning, advanced AI, and a biomarker for kidney decline offers veterinary teams a complete solution for CKD prediction, early diagnosis, monitoring, and staging. This is a game-changer for cats and their owners. While there remains no cure for CKD, early care can improve and prolong the lives of cats with this disease.⁵ While further studies are required to determine whether early intervention based on a cat's RenalTech status and follow-on SDMA will translate into improved outcomes, there is evidence to suggest that they might, providing hope for longer and higher-quality lives for cats with CKD.

Can AI predictive tools be developed for other conditions and diseases? “The key is being able to connect the data and integrate that data,” says O'Donnell. “We are on the edge of something quite remarkable that will increase the quality of life for the pets that we serve.” **TVN**

References

1. Marino CL, Lascelles BD, Vaden SL, et al. Prevalence and classification of chronic kidney disease in cats randomly selected from four age groups and in cats recruited for degenerative joint disease studies. *J Feline Med Surg* 2014;16(6):465-472.
2. Volk JO, Thomas JG, Collieran EJ, Siren CW. Executive summary of phase 3 of the Bayer veterinary care usage study. *JAVMA* 2014;244(7):744-745.
3. Hall JA, Yerramilli M, Obare E, et al. Comparison of serum concentrations of symmetric dimethylarginine and creatinine as kidney function biomarkers in cats with chronic kidney disease. *J Vet Intern Med* 2014;28(6):1676-1683.
4. Bradley R, Tagkopoulos I, Kim M, et al. Predicting early risk of chronic kidney disease in cats using routine clinical laboratory tests and machine learning. *J Vet Intern Med* 2019;33:2644-2656.
5. Cornell University College of Veterinary Medicine. Chronic Kidney Disease. vet.cornell.edu/departments-centers-and-institutes/cornell-feline-health-center/health-information/feline-health-topics/chronic-kidney-disease. Accessed February 23, 2020.

TABLE 2 Phase 2: Disease Staging and Monitoring

IRIS GUIDELINE CKD STAGE	TALKING POINTS FOR PET OWNERS
Stage 1 (early CKD)	<ul style="list-style-type: none"> ● At stage 1, emphasize the importance of adopting the following habits, which will be an ongoing part of a CKD cat's life: <ul style="list-style-type: none"> ● Keep fresh water available at all times ● Implement and maintain any recommended diet changes ● Avoid medications that can be toxic to kidneys ● Maintain good oral health ● Watch for loss of appetite, vomiting, frequent urination or drinking, and weight loss ● Explain the importance of more frequent veterinary monitoring now that disease is underway, encouraging owners to schedule the next few veterinary visits in advance to avoid gaps in care.
Stage 2 (early CKD)	<ul style="list-style-type: none"> ● Explain the importance of any recommended renal therapeutic diet and prescribed nutritional supplements. Because cats often lose their appetite in later stages, it's important to make any dietary transitions in stage 1 or 2. ● Emphasize the increased importance of regular veterinary monitoring. Scheduling re-check appointments with follow-up diagnostics is crucial.
Stage 3 (moderate CKD)	<ul style="list-style-type: none"> ● Remind pet owners of previous recommendations for stages 1 and 2. ● In addition, explain that cats in this stage may experience nausea and be reluctant to eat or drink. Note the need to monitor closely and report any changes in behavior. ● Highlight other symptoms to watch for: lethargy (from anemia) and vomiting. ● Diagnostic re-evaluation plays an important role in monitoring response to therapy, diet change, and anemia, so once again, encourage owners to forward-book their next few appointments.
Stage 4 (severe CKD)	<ul style="list-style-type: none"> ● Stage 4 requires implementation of all the outlined treatment strategies for stages 1-3. ● Additionally, offer guidance and support for pet owners whose cat may need frequent supplementation of subcutaneous fluids and a feeding tube to meet daily caloric requirements.