Streamlining Processes with AI

Artificial Intelligence Continues to Revolutionize Veterinary Medicine

by Jen Reeder

RECENTLY ERIC FEINSTEIN GREW FRUSTRATED HAVING TO WAIT SEVERAL WEEKS for biopsy results for his family's golden retriever, Brooks, not just because he was eager to start any necessary treatments for the beloved dog, but because he knew there was a much faster way to get results.

Feinstein is the CEO of Clarapath, a New York–based medical robotics company. Clarapath is in the final stages of developing SectionStar, a device that automates tissue sectioning and uses artificial intelligence (AI) and machine learning (a type of AI that uses data to help computer systems learn from themselves) to provide diagnostic results within hours. It launches later this year.

"When I told my family, I said, 'I could just take it to my lab here, process it, give us the results, digitize it, and do all of this within a couple of hours.' But we waited weeks. We had to wait those weeks and go on to surgery," he said. "It's just heartbreaking and you never want to see an animal suffer."

Sadly, cancer took the dog's life. The personal loss made Feinstein even more convinced that veterinary medicine needs to continue to evolve with the help of technology.

"It's anything that we can do to help expedite and treat things more effectively," he said. "How do we diagnose faster, more cost effectively, with a higher degree of quality?"

It's a question that many companies are seeking to answer with AI.

Veterinary medicine—and human medicine—has come a long way since the days of film radiographs. The digital age has ushered in a wave of AI developments that can streamline processes, deliver diagnostic results at point of care, increase revenue streams, and ultimately help veterinary teams provide the best medicine for pets.

There's no time like the present. As the pandemic drags into a third year, the veterinary profession faces daunting staffing shortages, higher caseloads due to pets acquired during lockdowns, and widespread burnout, so there's never been a better time to employ AI tools in your practice.

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For instance, Clarapath's SectionStar essentially does the work of a histotechnician and consolidates nine microtomy steps. The device processes tissue specimens to then output cut slides and images of the tissue at each step of the way. With a uniform width—down to the micron—to avoid fuzziness on slides, AI can provide quality diagnostics.

"You have a box that goes into the laboratory bench, and you load 72 different specimens into this device, and you walk away," Feinstein said. "It provides three hours of time to do other work. It's literally a factory in a box."

AI-powered diagnostics also offer a way to increase revenue streams. For example, while many practices don't charge for a veterinary technician manually estimating platelets prior to surgery, it can be a line-item charge on invoices when practices use the automated platelet count estimate from ScopioVet. This tool launched in 2021 as part of a digital cytology platform, said Asher Fink, president of the veterinary division of Scopio Labs.

The tool—which offers 100x magnification—uses AI to identify and count platelets on a blood smear in less than five minutes. This frees up veterinary technicians to complete other pressing tasks instead of doing a time-consuming manual count.

"When you productize an existing diagnostic technique, you bring it online. You make it super accurate—diagnostically and clinically impactful. You make it great for workflow and easy to use. And then you also create a win-win where the veterinarian is able to give better service to the client and the pet," Fink noted. "But you're also creating new ways to capture revenue for services rendered, which helps with the sustainability of the practice."

Another tool that saves teams time and helps enable quick decisions is Vetscan Imagyst, a Zoetis product—an 8 by 8 inches scanner—that offers digital cytology and AI-based fecal analysis.

Digital cytology readings come from pathologists in under two hours, while the fecal results take 10 to 15 minutes "at the same level of a board-certified parasitologist," according to Richard Goldstein, DVM, DACVIM, vice president and chief medical officer of global diagnostics at Zoetis.

"The point is to enable better decisionmaking—give the veterinarian all the information they could possibly need in real time at the point of care," he said. "Additional applications as they launch will also be AI-based, but always backed up by a human. If there are questions about it or if you want to submit it for further review, there'll always be an expert there, all within 2 hours—24 hours a day, 7 days a week, holidays included."

The next application—a blood smear evaluation free to Vetscan Imagyst users—launches in May.

"Every time we draw blood, we should be doing a CBC," Goldstein said. "So you make a blood smear, you stain it, you put it on Imagyst, and it gives you the result that a technician will give you in your practice within 10 minutes. If there are things that are worrisome, then you hit a button and it goes to a clinical pathologist. I do think it will really elevate the level of care in practice because it's something that's not done often right now because it's just too much of a hassle to do."

IDEXX is also harnessing AI to offer workflow solutions and improve veterinary care while teams are busier than ever.

"Pets are family now. And what do pet parents want for family? They want the highest standard of care that they

Incredibly, AI can be used not just to diagnose disease but to predict it.

can possibly get," said Jason Johnson, DVM, MS, DACT, vice president and global chief medical officer at IDEXX.

To that end, IDEXX offers an automated hematology analyzer called ProCyte One, which uses laser flow cytometry and sensors to simultaneously detect a vast amount of sample information from multiple cellular dimensions. AI software creates a clearer picture by

Pet Owners Using AI to Help Veterinarians

AI developments will help pet owners monitor health at home, too. Joseph Hahn, DVM, MA, BBA, executive director of U.S. companion animal and equine professional services at Merck Animal Health, said the company's Sure Petcare unit already offers activity trackers like the Animo collar for dogs and the Felaqua Connect watering dish for cats.

Merck Animal Health Intelligence is gathering data from the products to use AI and machine learning to get actionable items for care; for instance, if a cat starts drinking more water, he or she might need treatment for diabetes.

Future technological advances in home monitoring will radically change telemedicine and help strengthen bonds between veterinarians, clients, and pets, Hahn believes.

"I think we're getting to the point where telemedicine is going to be where these devices are in people's homes and that data, one day, will get to the veterinarian in the clinic almost automatically," he said. "It's going to be interesting and exciting to see where we go."

removing platelet clumps from the rest of the cellular populations, he noted.

Another product, SediVue Dx, analyzes urine sediment in five minutes or less with assistance from a database of around 800 million images called Neural Network 6.0.

"You put the sample onto the slide and in the instrument, and then through advanced cameras and an inverted microscope, scores and scores of images are taken, and this is where it really gets amazing: All those images are then fed into Neural Network 6.0, where the artificial intelligence analyzes every single cell and bacteria in there and narrows it down to the top 10 most clinically relevant things for the clinician and feeds that to the clinician in high quality," he said. "It's quicker, it's easier, it's intuitive. It solves a real clinical problem and can also help drive compliance when you show those images to pet parents."

Incredibly, AI can be used not just to diagnose disease but to predict it. At the end of 2019, Antech Diagnostics released RenalTech, which predicts—with at least 95% accuracy—whether a cat will develop chronic kidney disease (CKD) in the next two years.

The tool uses an algorithm based on deep analysis of large amounts of data—including 20 years of medical records of around 150,000 qualifying cats treated by Banfield Pet Hospital—to generate results based on urine and blood tests and the cat's age.

Jennifer Ogeer, DVM, MSc, MBA, MA, and vice president of medical science and innovation at Antech Diagnostics, said that as a veterinarian with around 30 years of experience in critical care, she's excited to have an option for practicing medicine beyond reacting to an existing condition.

"We now have the ability to do something in a proactive manner that potentially could either delay or even slow the progression of this disease," she said. "One of the most important aspects about knowing that a cat is going to develop chronic kidney disease is it affords us the opportunity to start to not only monitor that cat more closely, but we're also able to look to see, 'Are there comorbidities or concurrent conditions (like high blood pressure) that could predispose that cat to developing chronic kidney disease?'"
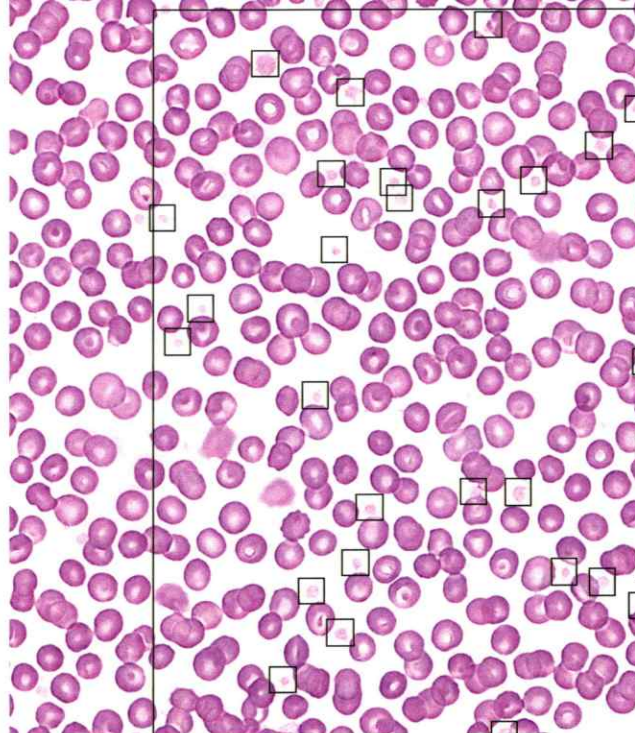
Platelets Image from ScopioVet automated platelet count estimate tool

Ogeer is currently managing CKD in her 17-year-old cat, Karamel, since she tested "RenalTech Positive." Her cat Abigail lived to be 23 despite having CKD through customized care, and many other pet owners want to get ahead of disease progression, too.

She said a one-year retrospective study of 730,000 veterinary visits found that, regardless of a cat's RenalTech status, just knowing the status compelled owners of both positive and negative cats to act more proactively, from purchasing therapeutic renal diets and medications to bringing pets in more often. Veterinary visits increased 31% for positive cats and 14% for negative cats.

Antech (part of Mars Veterinary Health) has a forthcoming tool to predict CKD in dogs that's been submitted to a journal for review, and Ogeer said there are predictive models for other diseases in veterinary patients in the innovation pipeline as well.

She's been asked by veterinarians, "Is AI going to replace us?" But she feels strongly that the answer is no—it's all about *helping* veterinarians.

"I'm actually now having something that's augmenting my ability to deliver not just good medicine, but to really strengthen the human-animal bond in a meaningful way," she said. "And there's nothing more rewarding than that in life."

Truly, the scope of AI developments can be mind-boggling. ImpriMed developed an AI-based algorithm that uses aspirated tumor cells from dogs with cancer to predict which chemotherapy treatment will be most effective for the patient. Vet Rocket is innovating in teleradiology, and Vetspire created an AI-driven practice management system. FreeStyle Libre offers a glucose monitoring device that pet owners can use for diabetic pets and then submit readings via an app directly to their veterinarian.

"We're living in an age that, when I first experienced veterinary medicine in the '90s, we couldn't even think of," said Jonathan Lustgarten, MS, PhD, VMD, senior biomedical informatics specialist at VCA and former president of the Association for Veterinary Informatics. "Especially with such high demand, in order to thrive and help us not burn out, we need things that could be done by a computer to be done by the computer."

Lustgarten believes collaboration will be key to continue elevating the profession through machine learning. He applauds AAHA for funding critical term standardization work at the Veterinary Services Terminology Laboratory and hopes practice management systems adopt it in an easy-to-use form. Interoperability will continue to further AI progress.

An important role of the nonprofit Association for Veterinary Informatics is to be a neutral party for collaboration between companies, according to Lustgarten.

"I make the comparison that every organization is a different train, and we want to be the Grand Central Station everyone pulls into," he said. "We will never be able to really leverage the technology until we all work on things together. All of us have very similar beliefs that there's so much opportunity and so much we can do for the veterinary world. It's a really exciting time, and it's a really busy time." ❋

Freelance journalist Jen Reeder is former president of the Dog Writers Association of America.