Dog's Best Friend

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Dog’s best friend: Humans are fetching up new ideas to improve health of canine companions

By Stephanie Jacques

A DOG’S SMILE — THAT DROOLING, BAD-BREATH SMILE — warms a dog lover’s heart and begs for a pat on the head or a scratch behind the ears. Kansas State University researchers and veterinarians are giving that and more to improve health for man and his best friend.

College of Veterinary Medicine researchers are extending pets’ quality of life while learning more about diseases that cross the species border between animals and people, such as breast cancer, bone cancer and arthritis.

"Similarly to how diseases in animals have been studied to advance human health, what we know about human diseases also can be applied to animal health," said Denver Marlow, university veterinarian and director of K-State’s Comparative Medicine Group. "There are many noninfectious, naturally-occurring diseases that affect both animals and humans."

According to researchers in the College of Veterinary Medicine, understanding and treating dogs with naturally acquired diseases can provide insights into human diseases since dogs have cellular similarities to humans, often share human environments and can share diseases.

"It all goes back to One Health," Marlow said. "What we learn about animal health helps advance veterinary and human medicine, as well as the discovery of new vaccines, drugs or therapies for treating or preventing diseases in animals and humans."

The One Health concept that human health is linked to animal and environmental health encourages collaboration among human health professionals, veterinarians and scientists on various stages of research — basic research in a lab, model systems testing, safety testing and, finally, clinical trials.

Among those working on health-related research in the college are three researchers who are at various research stages and who are specifically investigating diseases that affect dogs and humans.
Deciphering canine cellular communication

Understanding the secret language of dogs is more complex than figuring out what we read, bark and howl—moan, Anna Nguyen, associate professor of diagnostic medicine and pathology, is looking closer at canine cancer cell communication—or lack thereof. The research is based on her previous work with human breast cancer.

“There is a lack of understanding of cell-to-cell communication,” Nguyen said. “Normal cells have great communication and regulation. “There is a lack of understanding of cell-to-cell communication,” Nguyen said. “Normal cells have great communication and regulation. "There is a lack of understanding of cell-to-cell communication," based on her previous work with human breast cancer.

We do not see that with cancer cells. We want to learn more about how the loss of cell communication is the driving force of cancer.”

Nguyen and Luu said the targeted approach could prolong dogs’ quality of life and give a comparison to what the therapy can do for humans.

“If a dog gets cancer at 10 years of age, we cannot prevent death but we can prolong our quality of life,” Nguyen said. “That is an approach, a treatment, that could be beneficial — that’s worth in dog time, that’s long time. In humans, a comparable time frame would give more time to a patient for personalization.”

Give a dog a bone—fighting chance

Built into a veterinarian’s DNA is a love for animals and a desire to improve their health and welfare. Rwanea Woods, assistant professor of clinical sciences, is such a soul who is trying new treatment approaches to give her patients and their owners hope.

Woods and her colleague Mary Lynn Higginbotham, associate professor of clinical sciences, oversee an active clinical trials program at K-State’s Veterinary Health Center. One of their current clinical trials is enrolling pet dogs diagnosed with osteosarcoma, a common type of primary bone cancer in dogs and people, particularly children and young adults.

“Clinically and genetically, osteosarcoma is inextricably bind dogs and humans,” Woods said. “Any treatment we develop that shows clinical benefit in our canine patients can then be translated to provide benefits for children with osteosarcomas.”

The osteosarcoma clinical trial at K-State is part of a multi-institutional trial overseen by the National Institutes of Health National Cancer Institute’s Comparative Cancer Research Center and in comparative oncology program.

Nationally, the clinical trial has now enrolled more than 150 of the 200 dogs aimed at recruiting to the therapy and improve the short-term and long-term survival of cancer and the most common cancer in unspayed female dogs. In the initial stages, Luu found a decrease in the anxiety 41 points in the CMT27 cell line, which she said might be the cell of the loss of communication and has potential for targeted therapeutics that are needed in veterinary medicine.

According to Nguyen, current cancer treatments in dogs kill all cell growth — harming even healthy cells — in order to prevent the cancer cells from growing. Nguyen is looking for a more targeted approach that could open up closed communication channels called gap junctions in cancer cells and allow protein that regulates cell growth back into the cell. The approach already has been successful in Nguyen’s human breast cancer research and resulted in a patent.

“Cell communication blocks help in humans; it is could be in dogs, too,” Nguyen said. “If we can show that the cell communiz will help to improve the outcomes of both pets and humans.”

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That means the veterinarian and owners are willing to pursue immunotherapeutic studies to improve the outcomes of both pets and humans with cancer.”

Woods is recalling the dogs involved in the study to their owners, and if owners are biased and expect to see an improvement in their dogs, then there is a placebo effect in the short-term.”

Arthritis relief stems from cells

Mark Weiss, professor of anatomy and physiology, has unbiased data to prove he can make a case to start a similar clinical trial in humans with arthritis.

“We are extremely excited that our study showed that stem cells were safe and had a positive effect,” Weiss said. “We are extremely excited that our study showed that stem cells were safe and had a positive effect.”

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Woods said that the clinical trial that used stem cells in dogs to decrease pain from osteoarthritis, also a disease that affects humans, the study showed objective data — a first in canine studies with stem cells — that the therapy is effective at reducing pain.

“The preclinical data suggests that stem cell therapy could be dose-modulating—a game changer,” Weiss said. “We wanted to see if we could make clinical improvements in the animals. That’s what we got.”

The study, which enrolled 22 dogs diagnosed with hip arthritis, followed the patients for six months after placebo or stem cell therapy. The study was a double blind, placebo-controlled clinical trial, which means the veterinarian and the dog owner did not know which dogs received the stem cell treatment and which received a placebo injection.

“There is a placebo effect, even in dogs,” Weiss said. “Part of the problem is that dogs are not in the same room telling you they felt better. Dogs attempt to please their owners and if owners are biased and expect to see an improvement in their dogs, then there is a placebo effect in the short-term.”

The computer measurements from a pressure-sensing walkway showed that dogs that received stem cells — collected from the dogs’ intestinal fat — had modifications in weight distribution in the first month after the injection. The walkway provided measurable data in addition to subjective data from owner and veterinarian surveys that indicated that dogs that received the surgical treatments had significant functional improvements.

“We had one-month, two-month, three-month and six-month measurements from the walkway after treatment,” Weiss said. “At one month, the treated dogs showed improved health and the remaining improved six months later. We are extremely excited that our study showed that stem cells were safe and had a positive effect.”

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