UC DAVIS VETERINARY MEDICINE
Center for Companion Animal Health

CCAH Update

Fall • Winter 2013

CCAH-Funded Research: *Having an Impact*

Dear Friends:

Every day, in laboratories across our campus, UC Davis School of Veterinary Medicine faculty, residents and graduate students conduct groundbreaking research aimed at advancing the world's understanding of the diseases affecting companion animals. You might be surprised to learn that very few programs and institutions fund medical research to benefit our pets. Yet this research continues to transform what we know about animal diseases, often dramatically improving our ability to treat and even prevent them.

At the CCAH, one of our core missions is to raise and provide the funding that enables these studies to happen. Since 1985, CCAH has funded over $16 million in critical veterinary research. In this issue, we'll tell you about three recent CCAH-funded research discoveries that have enormous implications for the health of dogs. Two of them are likely to have huge impact on human health as well.

The CCAH funds about 50 research studies each year, offering roughly 20 small grants ($4,000) to residents who are just beginning their research careers and about 30 larger grants ($15,000) to seasoned faculty. In both cases, research ideas that get submitted to CCAH go through a rigorous review process. Our scientific review committee reads each grant and identifies those with the most potential for scientific discovery or the greatest potential impact on animal health. Occasionally, the committee will take a leap of faith, funding studies that will generate preliminary data that could serve as the basis for a larger study down the line. (These are considered high-risk, high-gain grants; Dr. Danika Bannasch's discovery of the gene responsible for urinary stones in Dalmatians, which you'll learn about in this issue, was one that paid off.) Once research studies are complete, the CCAH will also help defray the costs of publishing their results in veterinary journals, so that they can be seen by the larger veterinary scientific community and their research can have the greatest impact.

We are very proud of the work that our researchers continue to do here at Davis. We are equally proud and honored to steward the financial gifts entrusted to us by our donors, directing them toward studies that are quite literally changing the field of veterinary medicine and the lives of countless dogs, cats, and other companion species. You, our donors, are the investors that make these breakthroughs possible.

Sincerely,

Niels C. Pedersen, DVM, PhD
Director, CCAH

Michael Kent, DVM
Associate Director, CCAH

Also in this issue:

CCAH-Funded Research: Having an Impact

In recent months, UC Davis researchers have been making headlines for pushing veterinary knowledge into brand new territory. Some of the biggest breakthroughs have come in the field of genetics, with researchers pinpointing the key genes behind some of the most perplexing inherited diseases that plague companion animals.

Two center-funded gene studies have been garnering particularly strong attention—and for good reason. Both have led to significant discoveries that are having a big impact on the health of dogs—and, down the road, are likely to have a significant impact on human health as well.

Healthier Weimaraners

Earlier this year, Dr. Noa Safra, a post-doctoral fellow in Dr. Danika Bannasch's laboratory, identified the gene involved in spinal dysraphism—an inherited neural tube defect seen in Weimaraners. Adult dogs with the disease "bunny hop" with their back legs, unable to move normally. A number of breeds, even mixed breeds, can be affected by neural tube defects, some of which are debilitating.

> A gene mutation was identified as the underlying cause of spinal dysraphism in Weimaraners. This finding will be helpful in developing a reliable, affordable genetic test for dogs and enable owners to select against this disorder.

Veterinarians have known about spinal dysraphism for nearly a century—but it was not until Dr. Safra's research that the genetic mutation that causes the disease was identified. She and her fellow researchers compared the DNA sequences of affected and unaffected Weimaraners, looking for where and how these sequences were different. They quickly zoomed in on a gene called NKX2-8, where they found the mutation

Dr. Noa Safra, pictured with Evie, identified the gene involved in spinal dysraphism—an inherited neural tube defect seen in Weimaraners.

that causes the disorder. Their findings were published in the journal *PLoS Genetics* in July 2013.

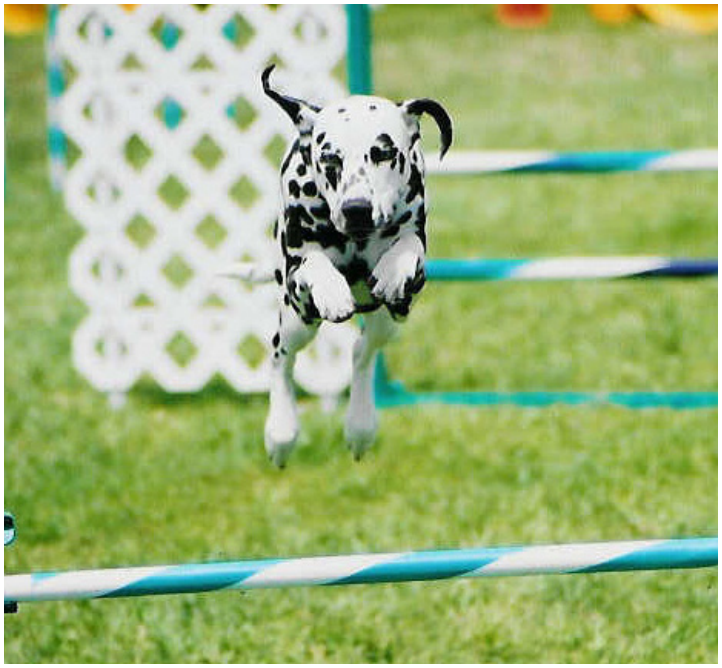
Dr. Safra's next step is to develop a reliable, affordable DNA test for the mutation—then offer it to dog owners, veterinarians, and dog breeders to help them select against the defect. Now that the underlying cause of the disease is known, Dr. Safra says, "There is no reason not to eliminate the problem completely." In other words, her discovery could abolish spinal dysraphism across the breed.

Helping Dalmatians

This is not the first time that a CCAH-funded genetic discovery has made it possible to radically improve the health of an entire breed.

In 2008, Dr. Danika Bannasch, a professor of genetics in the UC Davis School of Veterinary Medicine's Department of Population Health and Reproduction, spearheaded the discovery of the gene involved in another well-known canine disease—hyperuricemia, an inability to break down uric acid that can cause kidney and bladder stones in dogs, especially Dalmatians. These stones must often be removed surgically and, if untreated, can even lead to death.

Dr. Bannasch and her co-authors, which included Dr. Safra, discovered the cause of the hyperuricemia in dogs: a mutation in the SLC2A9 gene. While at least 17 breeds have been



Dr. Danika Bannasch and her co-authors discovered a gene involved in the formation of kidney and bladder stones in dogs, especially Dalmatians.

found to have the mutation—including Black Russian Terriers, American Staffordshire Terriers (pit bulls), bulldogs, and Parson Russell Terriers (Jack Russell Terriers)—all Dalmatians have the disease, making it devastating to the breed.

The discovery launched a new wave of effort to breed away from this mutation by "backcrossing" to a line of dogs that is genetically more than 99 percent Dalmatian yet does not have the mutation. "Many more breeders are now really dedicated to breeding these backcross dogs and breeding away from the problem," says Dr. Bannasch. "As a result, there are actually normal Dalmatians in the world." The American Kennel Club now allows registration of the healthier Dalmatian dogs within the official breed.

Hyperuricemia was once prevalent in Dalmatians. Left untreated, this disease could be fatal. Thanks to the discovery of the gene responsible for urinary stones, the health of the breed has dramatically improved.

Impact on Human Health

In addition to having a real clinical effect on thousands of dogs, Drs. Safra and Bannasch's discoveries are also causing ripples in the world of human medicine. The SLC2A9 gene that regulates uric acid levels in dogs also regulates it in people, and uric acid levels are correlated with health issues like kidney stones and gout. Meanwhile, the cause of neural tube defects in humans is poorly understood, says Dr. Safra. But University of Iowa pediatricians who collaborated in the study have already found the NKX2-8 gene to be mutated in children with spina bifida—a genetic connection that had never before been made. "This presents human researchers with a huge opportunity to investigate a gene not previously known to be involved in this important disease," Dr. Safra says.

In addition to helping pets enjoy healthier lives, CCAH-funded discoveries offer clues to health issues in people.

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CCAH-Funded Research: Having an Impact (continued)

Research Helping Cats

Our research studies are helping cats enjoy healthier lives. Below are some highlights of feline research studies we have funded.

Optimizing the dose of a chemotherapeutic agent (gemcitabine) for cats with cancer

Dr. Carlos Rodriguez
Lecturer, Surgical & Radiological Sciences

This study was designed to determine a safe and effective dose for gemcitabine, a chemotherapy drug, for use in tumor-bearing cats. This CCAH-funded study has proven particularly challenging because of the unique metabolism of this drug. This study generated data which has allowed us to optimize gemcitabine use in the cat *and* deliver a safe dose that is able to maintain blood levels long and high enough to treat oral squamous cell carcinoma in cats. The investigators are currently enrolling cats in an unfunded trial and have had encouraging results in three cats to date. They are hoping to enroll 25 cats.

Vaccination-associated sarcomas in cats – evaluating vaccinations and risks

Dr. Philip Kass
Professor, Population Health & Reproduction

This study examined the risks of developing a tumor at an injection site in cats receiving both the more traditional types of vaccines and the newer recombinant vaccines to see if the latter reduced the risk of tumor formation. It also looked at the risk of non-vaccine injections causing a tumor. The researchers found that all vaccines carried some risk, although the recombinant vaccines were associated with a lower incidence of tumors in the rear limb. The study also found that other injections such as long-acting steroids were also associated with tumor formation.

Home-Cooked Diet Study

Another recent CCAH-funded study, this one evaluating the nutritional completeness of publicly available recipes for home-cooked diets for dogs, has also been drawing major attention from veterinarians, dog owners, and media outlets across the country.

Drs. Jonathan Stockman and Jennifer Larsen analyzed 200 dog food recipes. This study was the largest ever evaluation of the nutritional quality of home-prepared diets for dogs.

Published in June 2013 in the *Journal of the American Veterinary Medical Association*, the nutrition study looked at 200 recipes from 34 different sources, including websites, pet care books, and veterinary textbooks, testing each meal to see if it met the basic dietary requirements for healthy adult dogs. Alarmingly, the vast majority of the recipes proved nutritionally deficient, which can lead to significant health problems.

> This study identified that most of the dog food recipes tested were nutritionally deficient. It is recommended to consult with a board-certified veterinary nutritionist to ensure that a home-cooked meal provides all essential nutrients.

"Ninety-five percent of the 200 diets we tested were deficient in at least one nutrient, and at least 84 percent were deficient in more than one nutrient," explains Dr. Jennifer Larsen,

– continued on page 5

Maxine Adler Endowed Chair in Genetics

Dr. Danika Bannasch is the first to hold the Maxine Adler Endowed Chair in Genetics, which was made possible by a generous gift from the estate of Ms. Maxine Adler. This endowed chair is a fitting legacy to Ms. Adler's lifelong passion for the health and well being of animals.

An endowed chair is among the most prestigious honors a faculty member can receive and supports excellence in teaching, research and public service.

Support from this endowment will provide Dr. Bannasch the opportunity to train undergraduate, graduate and professional students to utilize bioinformatics tools in research efforts to improve animal health.

Dr. Bannasch earned her Doctor of Veterinary Medicine degree from the UC Davis School of Veterinary Medicine and her PhD degree in mouse molecular genetics at Princeton University.

An accomplished veterinary geneticist, Dr. Bannasch focuses her research on the identification of the molecular causes of inherited disease in dogs and horses. Her laboratory has identified the DNA changes responsible for Lethal White Foal Syndrome, Hereditary Equine Regional Dermal Asthenia, Hyperuricosuria, Juvenile Addison's disease, Alaskan Husky Encephalopathy, Cleft palate, Cleft lip and palate, and Spinal Dysraphism.

Important research findings have also led to animal models used for similar human diseases. By studying naturally occurring diseases in animals, the Bannasch Laboratory is discovering a triad of significant advances: the development of diagnostic tests to aide animals breeders; the identification of novel genes and pathways as candidates for human disease; and an understanding of basic molecular mechanisms of disease.

Dr. Danika Bannasch, an accomplished veterinary geneticist, is the first to hold the Maxine Adler Endowed Chair in Genetics.

To learn more about the impact of endowed chairs, please contact the Development Office at (530) 752-7024.

CCAH-Funded Research (continued)

assistant professor of clinical nutrition and one of the authors of the study. Among the nutrients found lacking were vitamin E, choline, and trace minerals such as zinc, copper, and calcium.

The study was the largest ever evaluation of the nutritional quality of home-prepared dog diets, which are sometimes favored by owners who prefer to prepare their dogs' food themselves from fresh ingredients or who need to feed their animals a specialized diet due to diagnosed health issues.

Dr. Larsen says that home-cooked diets are still a great option for many owners and their animals. But she recommends that owners avoid general recipes from books and the Internet. Rather, she says, they should enlist the help of a board-certified veterinary nutritionist who can formulate a customized recipe that addresses all of their animal's needs.

Drs. Safra, Bannasch, and Larsen all credit the Center for Companion Animal Health with making their discoveries—and so many other critical research studies—possible. "By supporting a lot of the research we are doing," says Dr. Larsen, "the center is helping to improve the clinical care that we can provide to patients."

Interested in learning more about these researchers and their discoveries? Read our special online addition—**Q&A** with Drs. Bannasch, Larsen and Safra.

www.vetmed.ucdavis.edu/ccah/health_information/newsletter/news_supplements.cfm

Memorial Fund Donor Spotlight

Compassionate giving to the Companion Animal Memorial Fund

The Alamo Animal Hospital is devoted to the health and happiness of their patients. Every member of the hospital team cares deeply about pets and their families.

"We become close over the many years that we care for them, so we wanted a meaningful way to pay tribute to our clients and their beloved pets. This is our way of saying thank you for your trust and, hopefully, a way of improving the well-being of other pets."

– Dr. Peter Mangold, medical director of the Alamo Animal Hospital

Dr. Mangold is referring to the hospital's long-time practice of contributing to the Companion Animal Memorial Fund in memory of beloved pets. The fund supports research to better identify, diagnose, treat and prevent companion animal diseases and conditions. According to the hospital staff, many of their clients feel that the contribution is a heartfelt expression, knowing that their cherished family member is remembered in this special way.

"Donating to the CCAH gives us an opportunity to show our clients how much they and their loved ones mean to us," says Emily Mohr, manager of Alamo Animal Hospital. "As family pet healthcare providers, it's also rewarding to contribute to an organization that is working to further our ability to treat diseases in future patients."

Alamo Animal Hospital has been dedicated to providing exceptional veterinary medical and surgical care, along with excellent customer service and education, since 1973. Located in downtown Alamo, California, in the East Bay area between Walnut Creek and Danville, they provide complete care to dogs, cats, rodents, rabbits, small mammals, reptiles, and amphibians.

All of the doctors at Alamo Animal Hospital are graduates of the UC Davis School of Veterinary Medicine and continue a close association with the school. The doctors are recognized as referral partners and consult frequently with veterinary specialists at the school.

Support of the Companion Animal Memorial Fund is a legacy in which each of the Alamo Animal Hospital doctors and staff members takes pride. It flows from their commitment to build a sense of community with their patients and clients as they provide innovative and compassionate veterinary care.

Memorial Fund Founders' Awards

Balboa Pet Hospital of San Francisco was among four veterinary clinics honored with the Companion Animal Memorial Fund Founders' Award. Director Niels Pedersen presented the award to Alice Clary, wife of the late Dr. Paul Clary, the hospital's founder. She was joined by her daughters, Christie (left) and Colleen Clary.

Since 1985, when the program was established, Balboa Pet Hospital, Coffee Road Veterinary Clinic of Modesto, Cross Street Animal Veterinary Hospital of Tulare, and Terra Linda Veterinary Hospital of San Rafael have been honoring beloved pets through memorial contributions.

The program has grown to now include over 300 participating veterinary clinics throughout California and other Western states—contributing more than $260,000 in memorial gifts each year and improving the health of companion animals.

For more information about the ***Companion Animal Memorial Fund****, please contact the Development Office at* ***(530) 752-7024*** *or visit* ***www.vetmed.ucdavis.edu/CCAH/donations/camf.cfm****.*

Garrod Society Honor Roll

The Center for Companion Animal Health would like to honor members of the Garrod Society for your continuing, longtime support of 10 or more years. Thank you for your generosity and loyal commitment to advancing animal health!

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Ms. Lou Ann Archbold
Ms. Marilyn Wherry Barton
Ms. Alta E. Bassett &
Ms. Rosemary P. Berardino
Ms. Sandra Beach
Mrs. Perk C. Bell
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At the heart of our commitment to fighting cancer are our beloved animal friends.

The UC Davis School of Veterinary Medicine has been a leader in the fight against cancer since the 1970's. Effective treatment has been achieved using radiation therapy, limiting side effects and maximizing the chance of cure.

The challenge is the need to replace our 12-year old linear accelerator, which has reached its technical limitations, has become less reliable and too costly to repair.

Our vision for the future is to invest in a new linear accelerator, a Varian TrueBeam, to help achieve the best outcomes for our patients. It will also help us to develop new treatment techniques to drive the advances we need in our fight against cancer. To accomplish this, we have embarked on an effort to raise $2 million to have the new equipment in operation later this fall.

Let's fight cancer together. Your contribution will give our animal companions and the people who care for them a very special gift—the gift of hope.

To make a gift online, please visit our website:
www.vetmed.ucdavis.edu/development
(select the giving opportunity, "Linear Accelerator Campaign")

For more information on how you can help, please contact the Development Office at (530) 752-7024.

CCAH Update is published by the School of Veterinary Medicine at the University of California, Davis: Michael D. Lairmore, Dean, Niels C. Pedersen, Director, CCAH, Michael Kent, Associate Director, CCAH, Sharon Anglin, Celeste Borelli, Cheryl Cobbs, Jenny Johnston, Barbara Linderholm, Don Preisler, Carolyn Sawai and contributors, Drs. Danika Bannasch, Jennifer Larsen, Noa Safra and Jonathan Stockman.

The CCAH is dedicated to advancing studies in veterinary medicine—encompassing new ways to prevent, diagnose and treat diseases including cancers, genetic and immune disorders, infectious diseases, kidney and heart diseases, and nutritional disorders in companion animals. We welcome visitors to come and learn more about our mission and programs. To schedule a visit, please call (530) 752-7295.

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