



UC DAVIS
VETERINARY MEDICINE



2020 Annual Report

CENTER FOR COMPANION ANIMAL HEALTH

EXPECT GREATER: FROM UC DAVIS, FOR THE WORLD



Expect Greater: From UC Davis, for the world.

This simple idea encompasses what we do at the Center for Companion Animal Health. We all know that 2020 has been a difficult year, and we are rising to the university's challenge in adopting this statement. It reminds us of and cements our resolve to the commitment we have made to advance animal health and welfare. It reminds us that improving the lives of animals and their families must remain the heart of what we do, and it reminds us to fulfill the promise we have made to all of you. With your support, you have entrusted us to deliver the advances that are vital to achieving our mission and goals.

This year's annual report details how we are working to meet these important commitments. Inside, you will find more information on our achievements as well as insight into the future of veterinary medicine.

The CCAH remains strong and active. Despite the economic downturn resulting from the pandemic, we were able to distribute over \$1,600,000 in funding for equipment and research to improve the health of all companion animals. In addition, we have doubled down on our support for shelters across California and nationwide through new programs that give shelters the tools they need to become safer, more welcoming spaces, all while overcoming the additional challenges created by the pandemic.

Finally, I want to say thank you. It is your support that drives us, your support that allows us to carry out the research that leads to new diagnostics and treatments, and your support that is decreasing the numbers of animals in shelters and improving the lives for animals that do wind up in shelters. It is your support that leads to the improvement of companion animal health and welfare. Together, we will not only expect greater, we will deliver greater.

Stay well and stay safe.

My best,

Michael S. Kent, MAS, DVM, DACVIM, DACVR
Director, Center for Companion Animal Health
UC Davis, School of Veterinary Medicine

2019-2020
SUPPORT

INDIVIDUAL DONORS

1,374 donors
4,234 total gifts



TOTAL
DONATIONS

\$1,549,840

IN MEMORY

26,910 pets memorialized
through donations



OUR FUTURE

Grew endowments by 14.2%
to \$36,026,429

2019-2020 endowment
earnings \$725,502



HOW YOUR SUPPORT HELPS

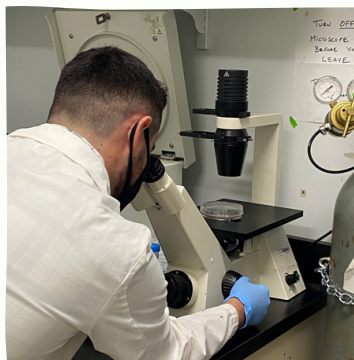
The CCAH is supported entirely by generous donations from individuals, veterinary practitioners, pet-related industries and private foundations. These donations fund academic studies and clinical research on diseases affecting dogs, cats and other small pets.

Programs your support impacts:

Faculty Research Grants: Awarded to our faculty to support the most innovative research to advance companion animal health.

Resident Research Grants: Gives residents the opportunity to carry out research in their area of specialty under the close mentorship of a faculty member.

Research Equipment Funding: These grants allow our faculty to repair and replace old equipment to be able to carry out their research.



The CCAH is a reflection of our partnerships with individuals and foundation members who seek to improve the lives of our animal companions.

Friends of Companion Animals Honor Roll

Thank you to our friends who helped the CCAH make a difference in our animal companions lives with donations of \$1,000 or more this past year.

Abbott Laboratories
 Don and Beth Abbott Charitable Giving Fund
 Maxine Adler *
 John Anderson and Elisabeth Walts
 Anonymous
 Stacey Baba & James Vokac Charitable Foundation
 Eric M. Berg Charitable Fund
 Richard and Martha Birmingham
 Grace Blair
 Arik and Anna Broitman
 Renee Cali
 Richard Callahan
 Michael Carney
 Glen and Angela Charles Family Foundation
 Jennifer Cheung
 Haley R. Cobb Charitable Foundation
 Janet and John Collins
 James and Zoe Cook
 Elizabeth Cordero
 Victoria Corrales
 DeDogue Charitable Fund
 Margaret DeMott-Feldman and Louis Feldman
 Zalec Familian and Lilian Levinson Foundation
 Mildred G. Federico Charitable Foundation
 Andrea and Matthew Fegley
 Allan Feinberg Fund
 Edwin and Patricia Fichtner
 Muriel Flitcroft *
 Geoffrey and Barbara Fong
 Winifred Fong
 FP Builders Charitable Fund
 Robert and Diana Friedman
 G.M. Lawrence Insurance Brokerage
 Mike and Teresa Gerutto
 Allan Ginsberg and Roberta Litzinger Ginsberg
 Google Inc.
 Mark and Terri Haddix
 Judith Hallman *

Raymond and Marianne Hammerschmidt
 Carol Horace
 Kathryn Ischinger
 Rajeev Jayavant and Ana Mendez
 Linda Jensen
 Jennifer Jones and Eric Leventhal
 Michael Kent and Karl Jandrey
 Barbara Kerr
 Jane Kievit *
 Laura Koeninger *
 Susan Koret
 Nancy Krakow *
 Krane Family Charitable Gift Fund
 Gail Lawrence
 Paul and Lea Levine Foundation
 Christina and Chee Louie
 Maddie's Fund
 Susan Mayes *
 Beverly and Fritz Maytag
 Howard McGill
 Nancy Mettler
 Patricia Mikkelsen
 Mark Miller
 George and Phyllis Miller Feline Health Center Fund
 Matthew and Monique Mulbry
 Diana Muller
 Gary Munoz
 Paul and Susan Nagata
 John Noll and Kathrin Stamp
 Northern Virginia Brittany Club
 Helen North-Root
 Jean Nunes
 Alfred Oliverio *
 Kim Ooi and Paul Neumeyer
 Kevin Ow-Wing
 Jerold Pearson Fund
 Laurel Place
 Thomas Pollock and Eileen Tabios

Bill Porter and Kirsten Greene
 Prometheus Life
 Bob and Lori Pryt
 Lorie Quinn and Jeffrey Lowenthal
 Janet Radford-Harris and Edward Harris
 Gregory and Suzanne Redican
 Martha Reese
 Joan Reynertson
 James Riker and Janell Sumida-Riker
 The Rosey Foundation
 Roy E. Hanson, Jr. Manufacturing
 Shirley Ruxton Soper
 Bille Sarzin
 William Satterthwaite
 Mary Seawright *
 Cheryl Sedestrom
 Shor-Line
 SOCK-FIP
 William Sommers and Sandra Black
 Gary and Cathy Spratling
 Donald and Robin Stanisich
 James Stimson
 William and Joan Strohauer
 Mariko Sugiyama
 Joy Susko *
 Marcia Syufy
 Jan Testarmata and David Underwood
 Maureen Tolson
 Katharine Tyson
 Nadya von Lorenz *
 Bruce Wagman
 Suzanne Walchli Charitable Fund
 Linda Wark
 Kurt Woodland Fund
 Karen Young
 Lin Zucconi

*Estate gift



CAMF Partnering Clinics

Thank you to our Companion Animal Memorial Fund veterinary partners for assisting with our mission to improve animal health. Over 250 of your local veterinarians and clinics donated to this fund this past year, raising \$235,040 to support research.

Anonymous
A Gentle Rest
Abby Pet Hospital
Acorn Hills Animal Center
Acorn Veterinary Clinic, Inc.
Adobe Veterinary Centers, LP
Advanced Veterinary Specialists
Aggie Animal Dental Center
Agoura Animal Clinic, Inc.
Alamo Animal Hospital
Alfred V. Atkinson, DVM, ABVP
All Creatures Animal Hospital & Bird Clinic
All Creatures Veterinary Hospital
All Pets Medical & Surgical Center
allCREATURES Veterinary Clinic, Inc.
Alta-Wood Animal Hospital
Alto Tiburon AVC, Inc.
Amador Valley Veterinary Center
AmeriVet Veterinary Partners
Animal & Bird Clinic of Mission Viejo, Inc.
Animal Care Clinic
Animal Clinic at Lake of the Pines, Inc.
Animal Clinic of Encino
Animal Hospital of Cloverdale
Animal Hospital of Sebastopol
Animal Housecall Service
Animal Medical Center
Anza Animal Clinic, Inc.
Aragon Veterinary Clinic, Inc.
Arbor Animal Hospital
Ark Veterinary Hospitals, Inc.
B & B Veterinary Hospital, Inc.
Balboa Pet Hospital
Banderas Pet Hospital, Inc.
Bay Area Animal Eye Care
Bear Valley Animal Clinic
Bel Marin Animal Hospital
Belmont Pet Hospital, Inc.
Bird & Pet Clinic of Roseville
Bishop Ranch Veterinary Center
Bishop Veterinary Hospital, Inc.
Blue Cross Pet Hospital
Blue Cross Veterinary Hospital
Blue Cross Veterinary Hospital, Inc.
Blue Oak Veterinary Hospital
Blue River PetCare
Brandner Veterinary Hospital, Inc.
Brentwood Family Pet Care
Broadway Pet Hospital, Inc.
Calvin G. Lum, D.V.M.
Camarosa Veterinary Clinic
Cambria Veterinary Clinic
Cameron Park Veterinary Hospital, Inc.

Camino Real Pet Clinic, Inc.
Canyon Hills Animal Clinic, Inc.
Care Veterinary Hospital
Carlsen Animal Hospital, Inc.
Cat and Bird Clinic
Cat Clinic
Cats Only Veterinary Hospital, Inc.
Centennial Animal Hospital, Inc.
Central Coast Veterinary Acupuncture
Ceres Veterinary Clinic, Inc.
Chabot Veterinary Clinic
Chad S. Alves, D.V.M.
Christine E. Sellers, D.V.M.
Cirby Ridge Animal Hospital
Coastside Veterinary Clinic, Inc.
Codornices Veterinary Clinic, Inc.
Coffee Road Veterinary Clinic
Companion Pet Clinic - Aloha
Compassion Pet Hospice
Concord Adobe Animal Hospital
County Line Animal Hospital, Inc.
Cross Street Small Animal Veterinary Hospital
Crystal Springs Pet Hospital, Inc.
Cuyamaca Animal Hospital, Inc.
Dana Niguel Veterinary Hospital
De Anza Veterinary Clinic
Debra K. Melcon, D.V.M.
Del Mar Heights Veterinary Hospital, Inc.
Del Mar Pet Hospital
Dentistry for Animals
Diablo View Veterinary Medical Hospital, Inc.
Discovery Bay Veterinary Clinic
Doctor's Office for Pets
Doctors Pet Clinic
Dog's Best Friend & the Cat's Meow, Inc.
Donner-Truckee Veterinary Hospital
East Bay Veterinary Services, Inc.
East San Rafael Veterinary Clinic
Edgewood Veterinary Clinic, Inc.
El Camino Veterinary Hospital
El Cerrito Veterinary Hospital
Emergency Pet Clinic of Temecula
Evergreen Animal Clinic, Inc.
Evergreen Veterinary Clinic
Evers Veterinary Clinic, Inc.
Exeter Veterinary Hospital
Fairview Animal Hospital
Four-Legged Friends Animal Hospital, Inc.
Global Veterinary Services, PLLC
Grantline Veterinary Hospital, Inc.
Hanford Veterinary Hospital
High Valley Veterinary Hospital
Hillcrest Veterinary Hospital

Howard Veterinary Consultation & Research
Ilsi V. Medearis, D.V.M.
Indian Creek Veterinary Clinic, Inc.
Irving Pet Hospital of San Francisco
Jennifer M. Rau, D.V.M.
Keely A. Commins, D.V.M.
King City Veterinary Hospital
Kristen A. Finch, D.V.M.
La Costa Animal Hospital, Inc.
La Cumbre Animal Hospital, Inc.
Ladera Ranch Animal Hospital, Inc.
Laguna Veterinary Hospital
Larkspur Landing Veterinary Hospital, Inc.
Lifetime Animal Care Center, Inc.
Livermore Veterinary Hospital
Lodi Veterinary Hospital
Lorinda C. Fallini, D.V.M.
Los Alamitos Animal Hospital, Inc.
Los Osos Pet Hospital
Manteca Veterinary Hospital
Marina Hills Animal Hospital, Inc.
Marina Pet Hospital
Matilija Veterinary Hospital, Inc.
McKenzie Animal Clinic, Inc.
Melanie L. Brazil, D.V.M.
Michele C. Chin, D.V.M.
Midtown Animal Hospital
Mid-Valley Veterinary Hospital
Miramonte Veterinary Hospital
Mobile Paws Veterinary Services
Mono Way Veterinary Hospital, Inc.
Montecito Animal Clinic
Moore Veterinary Care
Moraga Veterinary Hospital
Morro Bay Veterinary Clinic
Mount Diablo Veterinary Medical Center
Mount Shasta Animal Hospital, Inc.
MSSAH, Inc.
Muir Oaks Veterinary Hospital
Murphy Avenue Veterinary, Inc.
Napa Valley Veterinary Hospital, Inc.
National Veterinary Associates
Newbury Park Veterinary Clinic
Newport Hills Animal Hospital, Inc.
Nipomo Dog & Cat Hospital, Inc.
Northridge Veterinary Center, Inc.
Oak Park Veterinary Clinic
Oak Park Veterinary Hospital, Inc.
Oakland Veterinary Hospital
Oakridge Veterinary Clinic, Inc.
Oasis Veterinary Hospital
Occidental Veterinary Hospital
Ocean Beach Veterinary Clinic

Old Towne Animal Hospital
Ontario Veterinary Hospital, Inc.
Orange Canyon Pet Clinic
Oxnard Veterinary Hospital
Pacific Coast Equine Veterinary Services, Inc.
Park Centre Animal Hospital, Inc.
Peninsula Center Pet Hospital, Inc.
Penn Valley Veterinary Associates
Pet Vets of Folsom, Inc.
Petaluma Central Animal Hospital, Inc.
Peter B. Bloland, D.V.M., M.P.V.M.
Pets at Peace
PetVet Care Centers Mgmt LLC
Point Reyes Animal Hospital, Inc.
Point Vicente Animal Hospital
Rancho Bernardo Pet Hospital
Rancho Pet Hospital
Rancho Viejo Animal Hospital
Red Rabbit Veterinary Hospital
Redlands Animal Hospital, Inc.
Redwood Veterinary Hospital
Redwood Veterinary Hospital, Inc.
Reedley Veterinary Hospital
Richmond Veterinary Hospital
Robert A. Hagler, D.V.M.
Rochen C. Heers, D.V.M.
Rocklin Road Animal Hospital
Rural Animal Clinic, P.C.
Sage Rock Veterinary Services, P.C.
San Carlos Animal Hospital
San Diego Pet Hospital
San Joaquin Veterinary Hospital
San Marcos Veterinary Clinic
Scotts Valley Veterinary Clinic, Inc.
Seven Hills Veterinary Hospital, Inc.
Sheryl Eckstein, D.V.M.
Slate Creek Animal Hospital
South County Animal Hospital
South Novato Animal Hospital
Spring Valley Animal Medical Hospital, Inc.
Steele Canyon Veterinary Clinic, APC
Summit Veterinary Hospital & Kennels
Sunnyvale Veterinary Clinic, Inc.
Sunset Cliffs Animal Hospital
Susan Chew, D.V.M.
Tamalpais Pet Hospital, Inc.
Tarzana Pet Clinic, Inc.
Tassajara Veterinary Clinic
Teachapi Veterinary Hospital, Inc.
Templeton Farms
Terra Linda Veterinary Hospital, Inc.
The Ark Pet Hospital, Inc.
The Country Vet

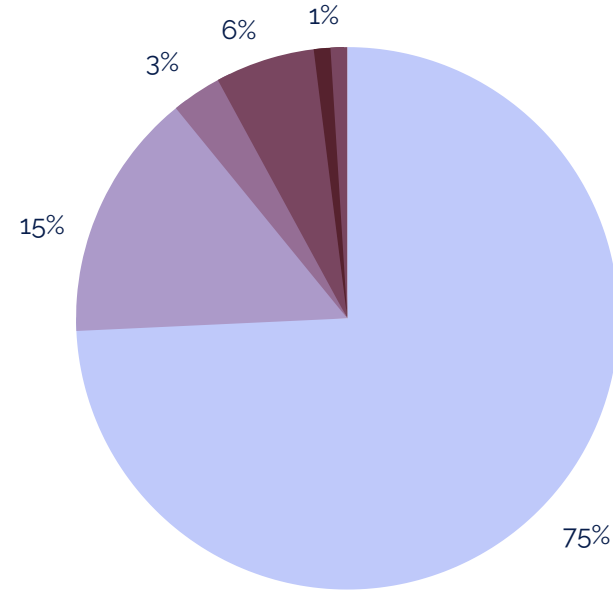
Thomas J. Willis, D.V.M.
Town & Country Animal Hospital
University Veterinary Hospital
Valley Animal Hospital of Merced
Valley Veterinary Clinic RB, Inc.
VCA Albany Animal Hospital
VCA All Our Pets Veterinary Hospital
VCA Animal Medical Center, Inc.
VCA Arroyo Animal Hospital
VCA Cottage Animal Hospital
VCA Emergency Animal Hospital
VCA Loomis Basin Veterinary Clinic
VCA Madera Pet Hospital, Inc.
VCA Marina Animal Hospital
VCA McClave Veterinary Hospital, Inc.
VCA Mueller Pet Medical Center
VCA Pet Medical Center
VCA West Los Angeles Animal Hospital
Vet N Care Disney Pet Hospital, Inc.
Veterinary Centers of America
Veterinary Medical Center of Turlock, Inc.
Veterinary Medical Center, Inc.
Village Oak Veterinary Hospital
Village Square Veterinary Hospital
Village Veterinary Clinic
Village Veterinary Clinic, Inc.
Village Veterinary Hospital
Walker Street Dog & Cat Hospital
Walnut Creek Veterinary Hospital
Washington Square Veterinary Clinic
Waterhouse Animal Hospital, Inc.
Western Veterinary Partners of California, PC
Wikiup Veterinary Hospital
Wilbak Corporation
William L. Klein, D.V.M.
Willow Rock Pet Hospital, Inc.
Woodside Veterinary Clinic
Ziya Veterinary Corporation, APC



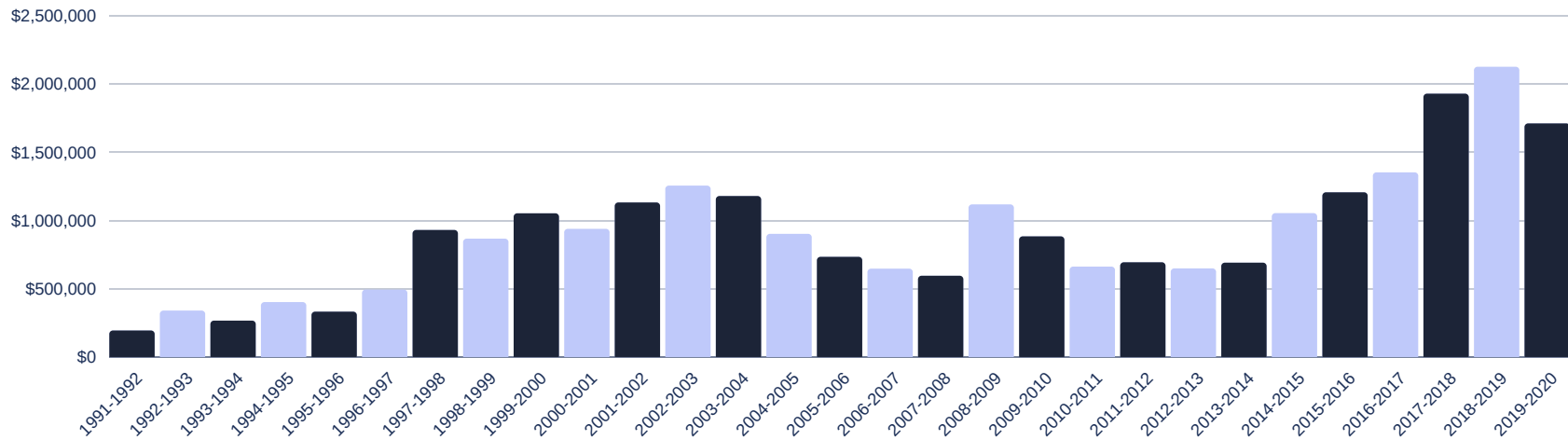
FY 2019-2020 CCAH Funded Awards

(July 1, 2019 - June 30, 2020)

Faculty Research Support \$1,264,560 (75%)
Faculty Equipment Support \$259,902 (15%)
Resident Research Support \$46,267 (3%)
Program Support Population Control, Radiation Oncology Bootcamp, Research Lab Support, All Species Imaging, Surgical Oncology \$102,568 (6%)
Student Research Support \$6,204 (1%)
Laboratory / Building Support \$11,775 (1%)



Since 1991 the CCAH has supported companion animal research by funding over \$26 million in studies



OUR LEADERSHIP TEAM



**Dr. Michael Kent, MAS, DVM,
DACVIM, DACVR**
Director



Dr. Kate Hurley, DVM, MPVM
Associate Director –
Shelter Medicine



**Dr. Robert Rebhun, DVM, PhD,
DACVIM (Oncology)**
Associate Director – Cancer



Dr. Danika Bannasch, DVM, PhD
Associate Director - Genetics

Our Scientific Advisory Committee: Assesses the scientific merit of each of the proposed faculty and resident studies and competitively decides which studies are the most promising to fund. This research ultimately advances the health, welfare and quality of medicine for companion animals. Committee members volunteer to serve a five-year term.

Dr. Peter Dickinson, BVSc, PhD, DACVIM (Neurology)
Dr. Amy Kapatkin, DVM, MAS, DACVS
Dr. David Maggs, BVSc, DACVO

Dr. Denis Marcellin-Little, DEDV, DACVS, DACVSMR
Dr. Bruno Pypendop, DrMedVet, DrVetSci, Dipl. ACVAA
Dr. Jodi Westropp, DVM, PhD, DACVIM

Our Center Team

Nancy Bei, Center Manager
Helen Sutton, Grants Administrator
Lyra Pineda-Nelson, Administrative Assistant

ACTIVE DOG RESEARCH STUDIES

FACULTY RESEARCH SUPPORT

72 Continuing Studies
18 New Studies



\$1,618,583

RESIDENT RESEARCH SUPPORT

12 Continuing Studies
5 New Studies



\$78,560



NEWLY FUNDED DOG STUDIES FOR FY 2020-2021

Cancer (Resident grant)

- **Non-visceral leiomyosarcoma in the dog: a retrospective study and literature review**

Leiomyosarcoma is a cancer that arises from smooth muscle and often requires special stains for diagnosis. It is most commonly seen in the gastrointestinal tract of dogs. The aims of this study are twofold: identify a group of client-owned dogs diagnosed with leiomyosarcomas in less common locations and summarize their diagnosis, treatment, and outcome and, second, to determine whether the soft tissue sarcoma grading scheme can be applied to leiomyosarcomas. The desired result of both aims is to provide more clarity about expected outcomes of these tumors, as well as to help provide the best possible treatment recommendation for the patients.

Cancer

- **Development of monoclonal antibody for dogs in the treatment of lymphoma**

The purpose of this grant is to fund a post-doctoral fellow for two years (50% per year) to work on monoclonal antibodies for dogs in the treatment of lymphoma.

- **Development of PDL1 and PD1 monoclonal antibody for dogs with cancer**

The purpose of this grant is to fund a staff research associate for two years (50% per year) to work on developing PDL1 and PD1 monoclonal antibodies for immunotherapy for dogs with cancer. We have produced the antibodies for staining tumors and are now working on developing them for treatment.

- **Allogeneic Natural Killer cells and palliative radiotherapy in the treatment of canine cancer**

The main objectives of this study are to provide preliminary data on allogeneic Natural Killer (NK) cells in dog cancer to test whether transferred NK cells will engraft into and persist in tumors causing the body to attack a tumor.

Cancer

- **Characterization of the canine aryl hydrocarbon receptor and its role in carcinogenesis**

The aryl hydrocarbon receptor (AHR) is a protein that can bind to DNA and alter the activity of nearby genes. These DNA sequences are found throughout the genome of many species and can potentially influence thousands of genes. AHR can be activated following exposure to different chemicals, some of which are synthetic environmental toxins found in common pesticides and herbicides. Since very little is known about AHR in dogs, this study aims to better understand the role of AHR in dogs' biology and evaluate the relationship between AHR and cancer in dogs.

- **Preliminary assessment of microwave ablation for adrenal neoplasia in dogs**

Adrenal masses of various types traditionally require aggressive surgery for treatment. As most patients are older when adrenal tumors occur, many have other chronic diseases that may increase risks or limit options for surgery and anesthesia. Thermal ablation methods have the promise of treating the tumor in place and may be performed with minimal invasiveness. There is very limited information on the use of these techniques in dogs with cancer. This study will evaluate the use of microwave ablation to minimally invasively treat adrenal tumors in dogs.

- **Exploring the therapeutic potential of a Rbm38 peptide for the treatment of canine lymphomas**

While overall prognosis for dogs with lymphoma has been improved, long-term survival remains poor. Previous studies showed that RNA binding protein Rbm38 is highly expressed in canine lymphomas, and we also found that targeting with a peptide called Pep8 leads tumor suppression in human cancer cells. As ~80% of canine lymphomas contain wild-type p53, we hypothesize that Pep8 can enhance p53 expression in canine lymphoma, and a treatment regimen consisting of Pep8 and doxorubicin may be explored as a therapeutic strategy to enhance treatment efficacy in canine lymphomas.

- **Olfactomedin-like 3 mediated microglial immunosuppression in glioma**

Canine gliomas are a common and lethal brain tumor. Microglia, the resident immune cells of the brain diffusely infiltrate canine gliomas, with the degree of infiltration positively correlated with tumor grade. Deletion of Olfml3 in a microglial cell line shifted the function of microglia towards promotion of inflammation and cytotoxicity, with a reduction in the production of a key pro-tumoral growth factor. Thus, it is possible that it contributes to the pro-tumor behavior of microglia. This project aims to determine the role of Olfml3 in microglial function determination and glioma progression, which will lead to the development of novel therapeutic targets for the treatment of canine glioma.

- **Olfactomedin-like 3 mediated angiogenesis in brain microvascular endothelial cells**

A key to canine glioma tumor survival and progression is the formation of new blood vessels. Olfactomedin-like 3 is a protein that promotes new blood vessel formation in cancers outside of the brain and compelling preliminary data indicates that it may contribute to new blood vessel formation in glioma. This study will expand upon these initial observations to determine the direct contribution of OLFML3 on blood vessel formation. These studies will advance our understanding of blood vessel formation in canine brain endothelial cells to inform the development of treatments for canine glioma.

- **Metronidazole for chemotherapy-induced diarrhea in dogs receiving Doxorubicin**

Chemotherapy can extend survival and improve quality of life in dogs with cancer. However, it also comes with the risk of side-effects. A major potential chemotherapy side effect in dogs is diarrhea that can cause dehydration, lead to hospitalization, and sometimes trigger the unnecessary discontinuation of an otherwise effective cancer treatment. Metronidazole, an antibiotic, is often used as a first-line treatment for dogs who get diarrhea from chemotherapy. This study aims to investigate if metronidazole is useful in shortening the duration of or preventing diarrhea caused by the commonly used chemotherapy drug, doxorubicin, and will help guide therapy choices.

Diabetes Management

- **PPAR α as metabolic target to restore intestinal permeability in a canine intestinal organoid model**
Obesity and diabetes mellitus (DM) continue to grow at alarming rates in pets, affecting over 100 million pets worldwide. Commonly known as a hyperglycemic metabolic disorder, DM is associated with defects in the intestinal barrier, commonly known as “leaky gut”. When damaged, the epithelial cell lining allows microbes to cross, increasing the risk for systemic infection and inflammation. A drug target, PPAR α , has been discovered that can reprogram cellular metabolism and restore intestinal barriers. Though the exact mechanism is still unclear, we also found that targeting PPAR α can reduce systemic inflammation and restore intestinal barriers in dogs with DM. This study will investigate how to leverage a metabolic drug target for PPAR α to restore intestinal barriers using a 3D-tissue model in a dish, and hopefully lead to new treatments.

Histopathology (Resident grant)

- **Cellular proliferation biomarker analysis in canine splenic tumor**
Abnormal tissue masses commonly develop in the spleens of older dogs and include non-cancerous blood clots and benign and malignant tumors. While histopathology may give us an answer about “what” particular disease is present, the current histopathology information available for spleen disease is poor at determining disease severity. Because of this, investigation into other potential “biomarkers” is important. This study proposes to evaluate previously stored spleen samples for the presence of Ki-67 and MCM2, which is done by applying unique staining material to slides, which contain small amounts of spleen tissue. The goal is to be able to compare the results of this histopathology evaluation to clinical outcome to obtain clinical relevant information.

Infectious Disease

- **Activated mesenchymal stem cell (MSCs) therapy for resistant bacterial bone infections**
The objective of this clinical trial is to use MSCs and antibiotics together to evaluate the safety and response to treatment in dogs with chronic orthopedic infections. This project will be a stepping stone for further research into mesenchymal stem cell treatment in animals affected by difficult to treat orthopedic bacterial infections.

Neurology

- **Mass spectrometry-based biomarker identification for canine non-infectious meningoencephalitis**
Non-infectious inflammation of the brain and meninges (meningoencephalitis) affects one out of every four dogs with brain disease. This study will see if there are small “marker” proteins (peptides) in the spinal fluid of dogs with meningoencephalitis that are not found in normal dogs with the goal of aiding in the diagnosis and monitoring of treatment response in these cases.
- **Pilot safety study of allopregnanolone, a potential therapeutic for status epilepticus in dogs**
There is a need for more effective medications to treat severe seizures (status epilepticus) in dogs. This project will study allopregnanolone (ALLO), a drug with powerful anti-seizure properties, for the treatment of canine status epilepticus. Successful studies of ALLO in dogs opens the path for the drug to be tested in other companion animals, such as cats and horses.
- **Evaluation of urodynamic effects of single dose tamsulosin in canine upper motor neuron bladders**
Dogs who suffer from acute spinal cord injury from a ‘slipped’ disc in the back often are unable to urinate voluntarily and their bladders fill and overflow. Such bladders are difficult to empty (express) by hand. Current drug therapy is not very effective. A newer medication called tamsulosin is a more targeted and specific drug that has promise, but its use has not been studied in dogs with an acute spinal cord injury. This study will test the medication in clinical patients to evaluate efficacy, as this could potentially establish a new standard of care.

Nutrition (Resident grant)

- **Determination of mammalian DNA in commercial canine treats and supplements**
Symptoms associated with food allergy in dogs are skin disease (itching and infections), gastrointestinal signs (vomiting or diarrhea), or both. Diagnosis is based on results of a dietary elimination trial. A previous study reported contamination in flavored medications and supplements. This study will use PCR technology to assess dog treats and supplements available in the USA for contamination with ingredients not included on the label to detect very small amounts of contamination and see if they can be used in dogs with allergies.

Surgery

- **Capsule endoscopy identification of gastrointestinal lesions in dogs with portosystemic shunts**

A portosystemic (liver) shunt is an abnormal blood vessel which causes blood to be diverted away from the liver preventing important substances from being made in the liver. Dogs enrolled in this study will be administered capsule endoscopy prior to and after treatment to study the frequency and severity of GI lesions in dogs with liver shunts and to determine if these GI lesions change after treatment.

Surgery (Resident grant)

- **Long-term outcome of nonunion fractures in dogs treated with bone morphogenetic protein (BMP)**

A nonunion fracture refers to a fracture in which all bone healing activity has stopped before complete healing has occurred. BMP is a protein that promotes new bone formation and has been used successfully for bone repair when standard treatments have failed. The aim of this study is to evaluate the long-term response in dogs with nonunion fractures that received rhBMP-2 and assess if rhBMP-2 can fully return abnormal bone to normal bone and hopefully improve outcomes of dogs with fractures.

Viral

- **Canine distemper hemagglutinin: association with pathogenesis and tissue tropism**

Distemper is a contagious and potentially lethal viral disease caused by canine distemper virus (CDV) and is more common in unvaccinated or incompletely vaccinated animals. Despite persistent efforts, distemper continues to pose a threat to dogs. This study will determine the ability of CDV to bind and replicate in different healthy dog tissues and quantify viral replication and distribution of lesions and viral particles. This baseline information could positively impact strategies for vaccination, treatment, and population health.

Wound Healing - Ophthalmology

- **Induction of antimicrobial peptides from canine corneal epithelial cells using natural molecule**

Infected ulcers are a common condition for dogs which require aggressive antibiotic treatment. However, due to their extensive use, bacteria have acquired resistance to some of the most common and powerful drugs. Cells that line the surface of the eye make small molecules called antimicrobial peptides (AMPs) with activity against bacteria. We have identified three molecules that can dramatically increase by 300-fold the amount of these AMPs made. This study is focused on the ability of canine corneal epithelial cells to increase AMP synthesis when treated with these herbal molecules.

- **Collagen crosslinking (CXL) with riboflavin for treatment of canine infectious keratitis**

Bacterial corneal infections are common and result in ocular pain and scarring, and can lead to blindness, globe rupture and eye loss. A few clinical trials have been performed in small numbers of dogs and suggest that CXL is safe and effective, but a large scale, prospective, clinical trial is needed to compare the efficacy and safety of CXL with standard treatment. This study is a multicenter clinical trial which will compare CXL and standard medical therapy and may lead to better treatments.

Wound Healing - Ophthalmology

(Resident grant)

- **In vivo Inhibition of tissue transglutaminase 2 (TGM2) to prevent corneal stromal haze**

Diseases of the cornea are a major cause of blindness and caused by infections or injury. The cornea must be clear to function and can easily scar making dogs blind. TGM2 is a drug that may avoid this scarring. This study will test the eye drop as a prevention of corneal scar development, supporting the use of this medication to prevent scar tissue formation, making a significant and broad impact by preventing blinding complications of corneal wound healing.

COMPLETED DOG STUDIES



CCAH donor-funded dog studies resulted in publications in FY-2019-2020



Cancer

Use of transrectal ultrasonography for assessment of the size and location of prostatic carcinoma in dogs

American Journal of Veterinary Research (November 2019)
Culp WTN, Johnson E, Giuffrida MA, Palm CA, Mayhew P, Kent MS, Rebhun RB, Burton JH

The interaction between RUNX2 and core binding factor beta as a potential therapeutic target in canine osteosarcoma

Veterinary and Comparative Oncology (March 2020)
Alegre F, Ormonde AR, Godinez DR, Illendula A, Bushweller JH, Wittenburg LA

Intramuscular diphenhydramine does not affect acute doxorubicin infusion-related arrhythmia number or severity in a prospective crossover study in canine lymphoma: A Pilot Study

Frontiers in Veterinary Science (July 2020)
Willcox JL, Belanger C, Burton JH, Yu L, Yu U, Visser LC, Skorupski K, Stern JA

Clinicopathological characteristics of histiocytic sarcoma affecting the central nervous system in dogs

Journal of Veterinary Internal Medicine (March 2020)
Toyoda I, Vernau W, Sturges BK, Vernau KM, Rossmeisl J, Zimmerman K, Crose CM, Woolard K, Giuffrida M, Higgins RJ, Dickinson PJ



Hematology

Canine platelets express functional Toll-like receptor-4: lipopolysaccharide-triggered platelet activation is dependent on adenosine diphosphate and thromboxane A₂ in dogs

BMC Veterinary Research (July 2019)
Li RHL, Nguyen N, Tablin F



Genetics

Pigment intensity in dogs is associated with a copy number variant upstream of KITLG

Genes (Basel) (January 2020)
Weich K, Affolter V, York D, Rebhun R, Kallenberg A, Bannasch D

Whole genome sequencing for mutation discovery in a single case of lysosomal storage disease (MPS type 1) in the dog

Scientific Reports (April 2020)
Mansour TA, Woolard KD, Vernau KL, Ancona DM, Thomasy SM, Sebbag L, Moore BA, Knipe MF, Seada HA, Cowan TM, Aguilar M, Brown CT, Bannasch DL



Surgery

Comparison of the efficacy and duration of desensitization of oral structures following injection of various volumes of a lidocaine-bupivacaine mixture via an infraorbital approach in dogs

American Journal of Veterinary Research (July 2020)
Pascoe PJ, Chohan AS

Utility of bronchoscopy combined with surgery in the treatment and outcomes of dogs with intrathoracic disease secondary to plant awn migration

Veterinary Surgery (July 2019)
Gibson EA, Balsa IM, Mayhew PD, Phillips K, Giuffrida MA, Culp WTN, Steffey MA, Johnson LR

ACTIVE MULTI-SPECIES RESEARCH STUDIES

FACULTY RESEARCH SUPPORT

5 Continuing Studies
2 New Studies



\$176,760

RESIDENT RESEARCH SUPPORT

5 Continuing Studies



\$9,767



NEWLY FUNDED MULTI-SPECIES STUDIES FOR FY 2020-2021

SARS-CoV-2

- **SARS-CoV-2 seroprevalence in dogs and cats at the UC Davis Veterinary Medical Teaching Hospital**

The ongoing COVID-19 pandemic has created a global health crisis that is unprecedented in modern times. Recently, companion cats, large exotic cats and sometimes dogs have been diagnosed with SARS-CoV-2, a causative agent of COVID-19. Antibodies are made in response to infections and are a reliable indicator that an animal has been previously exposed to the virus. Unfortunately, there are currently no commercially available blood tests for the detection of SARS-CoV-2 antibodies in cats and dogs. This study is developing serologic testing for SARS-CoV-2 in cats and dogs presenting to the UC Davis Veterinary Medical Teaching Hospital in 2020. This study will establish important methods for SARS-CoV-2 disease surveillance in companion animals and generate data regarding the frequency of SARS-CoV-2 exposure in cats and dogs in California.

Nutrition

- **Fatty acid analysis and stability of selected vegetable and fish oils**

Studies have shown that many recipes for home-prepared diets are not nutritionally balanced, which may have detrimental effects when fed long-term. Various vegetable and fish oils are commonly used in recipes for pets to provide fatty acids which are essential nutrients. However, the fatty acid profiles of oils available in supermarkets can be different than assumed in computer nutrition programs. In addition, nutrients in oils may degrade over time as they tend to be fragile to heat, light, and other normal conditions of typical kitchens. This study aims to define the fatty acid profiles of various vegetable and fish oils, and to monitor these products over time to assess for nutrient degradation. This information will help nutritionists to formulate more accurate and balanced diets for dogs and cats.

ACTIVE CAT RESEARCH STUDIES

FACULTY RESEARCH SUPPORT

25 Continuing Studies
10 New Studies



\$867,435

RESIDENT RESEARCH SUPPORT

1 Continuing Study
1 New Study



\$10,000



NEWLY FUNDED CAT STUDIES FOR FY 2020-2021

Anesthesia

- **Treatment of dexmedetomidine and vatinoxan-induced hypotension in isoflurane-anesthetized cats**

Cats are often anesthetized to facilitate treatment of various conditions. Many drugs used for anesthesia cause a profound decrease in blood pressure, resulting in more complications in cats than in some other species like dogs. We have examined the use of dexmedetomidine and vatinoxan to reduce the use of anesthetic drugs, expecting that blood pressure would improve. In this study, we propose to characterize the effects of three drugs likely to increase blood pressure during administration of dexmedetomidine and vatinoxan in anesthetized cats. The goal is to find a drug combination that increases the safety of anesthesia in cats.



- **Pulmonary effects of positive end-expiratory pressure (PEEP) in ventilated-anesthetized cats**

Ventilation of the lungs is a common life-support therapy used in cats to mitigate the decreased pulmonary function observed during anesthesia. The current lack of information about the lung effects of PEEP in anesthetized cats precludes the advancement of strategies of ventilation in this species that could potentially result in improved clinical outcomes. This study will provide groundbreaking information to guide not only the clinician on the use of PEEP during anesthesia but also on the future development of ventilation strategies that can improve the clinical outcomes of cats.

Anesthesia (Resident grant)

- **Cardiovascular effects of positive end-expiratory pressure in cats anesthetized with isoflurane**

Cats are regularly anesthetized for surgical and diagnostic procedures and commonly require artificial respiration to maintain adequate pulmonary function during anesthesia. The derangements in pulmonary function associated with anesthesia can be minimized or prevented by the use of positive pressure at the end of the expiratory phase of artificial ventilation, normally referred as PEEP. However, the effects of different levels of PEEP upon the cardiovascular function need to be evaluated in anesthetized cats. The aim of this project is to measure and compare the main parameters of cardiovascular performance in anesthetized cats artificially ventilated for three hours with no PEEP and three different levels of PEEP. The outcomes of this project will help the clinician to establish criteria to select appropriate levels of PEEP to be used in anesthetized cats.

Health / Longevity

- **Longevity in cats**

While gains have been made in diagnosing and treating common cat diseases, there is little known, beyond anecdotal data, as to how long cats live. Further, we do not know in detail the major causes of death in cats and what factors affect this. To study this further we have begun looking at this by examining the over 3,500 post mortem exams that have been done at the UC Davis Veterinary Medical Teaching Hospital since 1989. We are then reviewing each pathology report to determine a cause of death and what organ systems were affected. We are also recording other diseases that did not directly result in their demise. By doing this we hope to better understand the aging process in cats, their longevity, and causes of disease.

Hematology

- **Effects of single-dose enoxaparin on viscoelastic coagulation in cats**

The recent development of a point-of-care laboratory device has led to a new era for advancements into treatment and monitoring of bleeding and clotting disorders in cats. Cats with hypertrophic cardiomyopathy (HCM) are predisposed to form clots and often have life-threatening or fatal complications because of them. This study will examine the effects of a commonly used drug used to prevent clotting in cats. The data acquired from this point-of-care device using a small blood sample of a healthy cat will be compared to many other measurements related to clot formation, to better understand the effects of this drug and allow for optimized and individualized therapy.

Histopathology

- **Standardizing the histopathologic assessment of small intestinal biopsies from cats**

Intestinal biopsies are important to determine the cause of intestinal problems in cats and the obtained information is used to guide treatment. This study will develop an artificial intelligence-based image analysis tool that can recognize and count inflammatory cells in biopsies. We expect that this tool will reduce the variability in biopsy evaluations, which will improve the quality of the diagnostic process for individual patients and benefit research studies that strive to further our knowledge on Inflammatory Bowel Disease in cats.



Infectious Disease

- **Immunophenotype of feline peritoneal macrophages and their role in the pathogenesis of FIP**

Feline infectious peritonitis (FIP) is a generally lethal disease of domestic cats caused by an infection with a feline coronavirus. One of the important features of the FIP disease that is still poorly understood is the precise nature of the feline cell that the virus infects. The coronavirus that causes FIP is suspected to target a specific type of white blood cell (WBC) in the abdominal cavity and use that cell to spread throughout the cat's body. At present, these WBCs targeted by the virus have been poorly characterized. A better understanding of these cells may provide critical insights into prevention and treatment strategies for this generally fatal feline disease.

- **Endoscopically versus surgically acquired biopsies for the diagnosis of feline chronic enteropathy**

Chronic intestinal disease is very common in cats and the rate of occurrence has steadily increased over the past 20 years. Diagnosis requires the collection of biopsies from the intestines and analysis by a pathologist. Biopsies can be collected either endoscopically or surgically. Endoscopy is a minimally-invasive procedure using a flexible tube (i.e., endoscope) that can visualize and biopsy the lining of the intestines, but optimal technique for biopsy collection is still unknown. This study aims to determine the best method of biopsy collection from the intestines of cats suffering from chronic intestinal disease. Results of this study will provide invaluable information for veterinarians, cats and clients, and may help to significantly reduce post-procedural pain and complications.

- **Non-receptor mediated cell targeting of feline coronavirus through extracellular vesicles**

Feline Infectious Peritonitis virus (FIPV) can attack multiple tissue systems. In cats, the switch from mild (intestinal) coronaviral disease happens when the virus acquires the ability to infect new cell types and rapidly spread throughout the body. FIP is fatal, and there are fundamental questions about pathogenesis that would help develop a variety of treatment options. This study is designed to uncover how FIPV moves from one cell to the next. A full understanding of the novel ways in which these devastating viral pathogens can invade multiple tissues is needed to pave the way for more effective diagnostics and treatments.

Nutrition

- **Effect of age, sex, and body weight on the antioxidant and vitamin status in cats**

Life expectancy of cats is increasing worldwide including in the United States. However, to our knowledge, no data are available on the vitamin and antioxidant status of cats as they age. This gap of knowledge undermines the resources needed by pet owners and clinicians to make informed decisions on (for instance) dietary supplements. This project seeks to evaluate vitamins B1 and B2 status in red blood cells of cats aged 1 to 13 years to establish the baselines for the content of these vitamins and their role in antioxidant defenses.

Renal / Kidney Disease

- **Evaluation of leptospira exposure and infection in a feral cat population**

Leptospirosis is a re-emerging bacterial disease that can cause severe illness in animals leading to kidney and liver failure. Sparse information is available about how often cats are exposed or become infected. Understanding the extent to which cats are infected and exposed to leptospire in a given geographical location provides relevant epidemiologic and surveillance data and informs veterinarians of potential infection risk to cats. This study aims to determine the level of leptospiral exposure (antibody detection) and infection (leptospiral DNA detection with PCR) in a region of Northern California and to validate an easier test for its detection.



COMPLETED CAT STUDIES

7

CCAH donor-funded cat studies resulted in publications in FY-2019-2020



Dentistry

A multicenter experience using adipose-derived mesenchymal stem cell therapy for cats with chronic, non-responsive gingivostomatitis

Stem Cell Research & Therapy (March 2020)

Arzi B, Peralta S, Fiani N, Vapniarsky N, Taechangam N, Delatorre U, Clark KC, Walker N, Loscar M, Lommer MJ, Fulton M, Battig J, Borjesson D



Hematology

Assessment of P2Y₁₂ inhibition by clopidogrel in feline platelets using flow cytometry quantification of vasodilator-stimulated phosphoprotein phosphorylation

Frontiers in Veterinary Science (April 2020)

Li RHL, Nguyen N, Rosati T, Jandrey K



Immunology

Topology and expressed repertoire of the *Felis catus* T cell receptor loci

BMC Genomics (January 2020)

Radtanakatikanon A, Keller SM, Darzentas N, Moore PF, Folch G, Ngoune VN, Lefranc MP, Vernau W



Infectious Disease

Perspectives: potential therapeutic options for SARS-CoV-2 patients based on feline infectious peritonitis strategies: central nervous system invasion and drug coverage

International Journal of Antimicrobial Agents (June 2020)

Olsen M, Cook SE, Huang V, Pedersen N, Murphy BG



Surgery

An RNA-directed gene editing strategy for attenuating the infectious potential of feline immunodeficiency virus-infected cells: a proof of concept

Viruses (May 2020)

Murphy BG, Wolf T, Vogel H, Castillo D, Woolard K

Cardiopulmonary effects of dexmedetomidine, with and without vatinoxan, in isoflurane-anesthetized cats

Veterinary Anaesthesia and Analgesia (November 2019)

Jaeger AT, Pypendop BH, Ahokoivu H, Honkavaara J

Effects of famciclovir in cats with spontaneous acute upper respiratory tract disease

Journal of Feline Medicine and Surgery (June 2020)

Kopečný L, Maggs DJ, Leutenegger CM, Johnson LR



ACTIVE AVIAN, REPTILE & OTHER COMPANION ANIMAL RESEARCH STUDIES



FACULTY RESEARCH SUPPORT

5 Continuing Studies

2 New Studies



\$90,263

RESIDENT RESEARCH SUPPORT

3 Continuing Studies

1 New Studies



\$20,000

NEWLY FUNDED AVIAN, REPTILE & OTHER COMPANION ANIMAL STUDIES FOR FY 2020-2021

Avian (Resident grant)

- **Pharmacokinetics and safety of oral grapiprant administration to red-tailed hawks (*B. jamaicensis*)**

Osteoarthritis (OA) is a common ailment in red-tailed hawks causing inflammation and pain, lameness and inability to fly. Grapiprant is a new NSAID used to treat this. This study will find how a hawk absorbs and metabolizes grapiprant to provide information about treatment and long-term pain management for birds with OA.

Fish (Koi)

- **Efficacy of multiple dose acyclovir against Cyprinid Herpesvirus 3 infection in koi, *Cyprinus carpio***

Koi Herpesvirus (KHV) is a viral disease of koi fish that has been shown to cause mass mortalities in captive and wild populations of fish worldwide, and the virus is 80-100% fatal. There are no vaccines available against KHV infections. This study will test if acyclovir (an anti-viral drug) can treat this deadly virus.

Pig (Companion)

- **Continuous fluid infusion per rectum compared with intravenous fluid infusion in pigs**

Companion pigs are becoming a more popular pet with several hundred seen at the hospital each year. Placement of intravenous catheters for fluid administration is often difficult or impossible because the blood vessels are not easily accessible or the patient becomes extremely stressed, requiring sedation or anesthesia. This study will test using fluids administered through the rectum as a safer, less stressful, alternative.

COMPLETED AVIAN, REPTILE & OTHER COMPANION ANIMAL STUDIES

5

CCAH donor-funded studies resulted in publications in FY-2019-2020



Bearded Dragon

Evaluation of a ventral and a left lateral approach to coelioscopy in bearded dragons (*Pogona vitticeps*)

American Journal of Veterinary Research, (March 2020)
Frei S, Guzman DS-M, Kass PH, Giuffrida MA, Mayhew PD



Fish

The formation, persistence, and resistance to disinfectant of the *Erysipelothrix piscisarius* biofilm

Journal of Aquatic Animal Health (January 2020)
Pomaranski E, Soto E

Non-lethal diagnostic methods for koi herpesvirus in koi *Cyprinus carpio*

Diseases of Aquatic Organisms (March 2020)
Soto E, Tamez-Trevino E, Yarzdi Z, Stevens BN, Yun S, Martinez-Lopez B, Burges J



Rabbit

Pharmacokinetics of maropitant citrate in New Zealand White rabbits (*Oryctolagus cuniculus*)

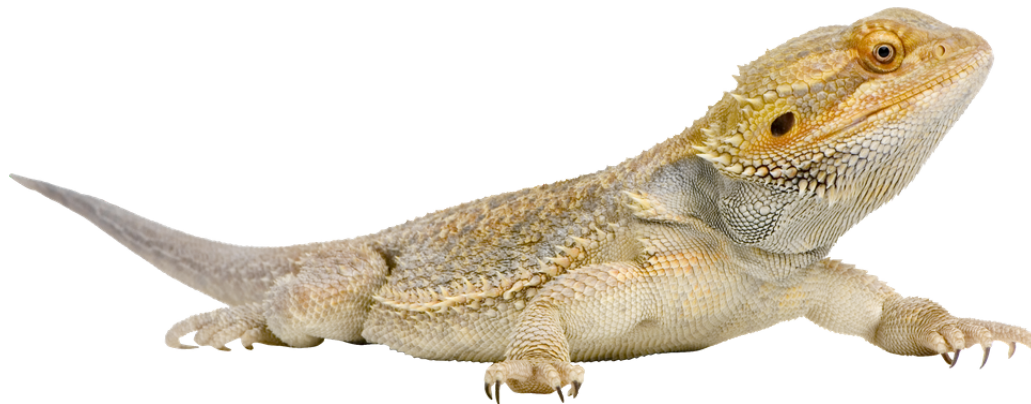
American Journal of Veterinary Research, (October 2019)
Ozawa SM, Hawkins MG, Drazenovich TL, Kass PH, Knych K



Rat

Evaluation of deslorelin implant on subsequent mammary tumors of rats (*Rattus norvegicus*)

Journal of Exotic Pet Medicine (October 2019)
Vergneau-Grosset C, Peña L, Cluzel C, Hawkins MG, Maccolini E, Sinclair K, Graham J, Sadar MJ, Guzman DS-M, Lair S, Langlois I, Paul-Murphy J



2019-2020
Equipment Support
19 Projects Funded
\$259,902



DILEMMA

Research does not happen without equipment. Most grants will not pay for the equipment needed to perform research.

SOLUTION

We are addressing this gap by providing earmarked funds that allow our researchers to obtain the equipment they need in order to carry out the research that advances animal well-being and health. Whether it is a standard workhorse piece of equipment, like a freezer or centrifuge, a new advanced imaging device, or piece of laboratory equipment, your support helps make it all happen.

Research made possible by your support:



PerfectPitch 6-DoF Couch for TrueBeam Linear Accelerator

Principal Investigator: Michael Kent

A robotic couch designed to deliver radiation therapy techniques with a high level of accuracy. Allowing for two additional axes of rotation, the 6DoF couch adjusts seamlessly on six axes, facilitating treatments that are more accurate with decreased anesthesia time.

Biomomentum Mach-1

Principal Investigator: Natalia Vapniarski Arzi

The Mach-1 is a device that allows us to test the biomechanical strength and properties of multiple structures including joint cartilage, bone, tendons, the eye lens, and ligaments to help us develop new ways to treat disease affecting these tissues.

Compute server for genetics, genomics and transcriptomics work

Principal Investigator: Titus Brown

This server will be used for DNA sequence alignment and downstream data analysis for genetics, transcriptomics, and other large-scale data analysis used by researchers working on cancer, and other genetics projects.

Qubit Flex

Principal Investigator: Stefan Keller

Precise quantification of DNA, RNA or protein is the basis for a range of laboratory methods used in animal health research. This instrument is used to measure the concentration of DNA, RNA or protein.

Thrombodynamics Assay

Principal Investigator: Ronald Li

The Thrombodynamics assay is an innovative coagulation test that will be shared among the Emergency and Critical Care Service, Cardiology and Internal Medicine. This machine allows the study of clotting and anti-clot therapy in companion animals.

Sorvall Benchtop Centrifuge with rotor and adaptor

Principal Investigator: Brian Leonard

This centrifuge is being used to help develop fluorescently labeled proteins to help study tear film stability with the ultimate goal to develop novel therapeutics for the treatment of dry eye disease in dogs.

Storz Pediatric Veterinary Video Endoscope

Principal Investigator: Stanley Marks

This pediatric veterinary video endoscope represents a state-of-the art endoscope with optimal dimensions for collecting endoscopic biopsies from the stomach and intestinal tract of kittens and adult cats, which larger endoscopes are unable to reach. This is important to obtain samples less invasively than surgery for diagnosing disease.

Centrifuge, automated cell counter, pipettes

Principal Investigator: Robert Rebhun

This equipment was purchased to setup of a PBMC processing station within the comparative oncology lab, which is used to collect immune cells to monitor patients on immunotherapy clinical trials.

Eppendorf ThermoMixer

Principal Investigator: Ryan Toedebusch

This machine will be used in neurology research and is essential for countless molecular biology techniques. It has the capability to mix, heat, and cool research samples in one instrument for unparalleled flexibility, allowing the purification of plasmids/RNA/DNA, performing enzymatic reactions, bacterial growth for recombinant protein production, and cDNA synthesis.

CURO Veterinary for acoustic myography

Principal Investigator: Peter Dickinson

The CURO Veterinary device uses acoustic myography to help diagnose neuromuscular disease by assessing muscle contraction based on sound waves generated by the muscle allowing non-anesthetized recording.

Shelter enclosure enrichment-feline

Principal Investigator: Andrea Fascetti

The grant will be used to enhance and add more enrichment for cats involved in nutrition studies. Research has found that by creating larger enclosures the cats were happier with more climbing structures, hammocks and sleeping cubbies.

Ophthalmic freezer

Principal Investigator: Sara Thomasy

Archiving clinical and research specimens can be challenging without proper storage conditions and low temperature freezers. This freezer is specifically designated for ophthalmology research.

DRE Volumax VOS Veterinary Oxygen System

Principal Investigator: Joao Soares

The DRE Volumax VOS Veterinary Oxygen System is a nasal cannula system that can provide high flows of humidified oxygen, which may allow for noninvasive ventilatory support in patients with respiratory insufficiency.

Du LabCams for iPhone XR 11, reticles for LabCams, iPhones

Principal Investigator: Karen Shapiro

Companion reptiles are commonly presented to veterinarians for protozoal infections, but resources for accurate identification of these parasites are limited. This equipment will use video capture of parasite morphology and motility immediately after defecation for identification and develop PCR tests for detection and characterization of reptile protozoa.

Chemistudio

Principal Investigator: Jin Zhang

The chemistudio imaging system can be used for both genomic and proteomic applications producing high resolution and sensitive imaging of protein, DNA, and cell colonies.

3D Laparoscope (TipCam, Karl Storz)

Principal Investigator: Ingrid Balsa

This 3D laparoscope allows for depth perception and spatial orientation and will improve surgical outcomes and allow for more minimally invasive procedures on companion animals.

Harmonic Scalpel (Ethicon Endosurgery Inc.)

Principal Investigator: Philipp Mayhew

This is an ultrasonic dissection device that is commonly used in human, but not in veterinary surgery. This is used for various procedures including minimally invasive and open surgery, which has been shown to induce less inflammation and generate lower temperatures compared to other devices and acts as a vessel-sealing device.

Physiograph

Principal Investigator: Bruno Pypendop

A physiograph is essential for research on the pharmacology of anesthetic and pain relieving medication for the development of new and safer anesthetics.

Leading through COVID-19: The Koret Shelter Medicine Program pivots program, leverages infrastructure during crisis

When COVID hit and our country was ordered to shelter-in-place, animal shelters were left in a crunch. While most were deemed essential, many organizations, especially municipal or those with municipal contracts, did not have the staffing levels needed to work in the split shifts that are necessary to safeguard an organization from a full shutdown should a staff member contract COVID-19. Some shelters moved to emergency-only intake and appointment-based services for medical, adoption and foster appointments, while others had more animals coming in than were able to leave through adoption or foster. Nearly all shelters were scrambling to find protocols that would guide them through safe operations during the unprecedented time when many Americans and their pets were losing their housing.

Our helpline, email boxes, and phones began overflowing immediately. Thankfully, a little over two years ago, KSMP began investing in a more scalable, online approach to shelter consultations and information sharing, a decision that enabled our small program to hit the ground running in the face of crisis. We quickly coupled the Shelter Medicine Resource Library with KSMP's online infrastructure and repurposed teaching modules to assist the sheltering community through the crisis on a new website, ShelterMedPortal.com.

KSMP, in collaboration with a handful of other academic and professional organizations, developed nationally endorsed protocols to expand shelters' most essential programs such as foster care and adoption online, and to handle emergencies, animal drop off and pick up safely. To meet state-specific needs, KSMP formed the



California Animal Shelter COVID Action Response (CASCAR) team, a coalition of California animal shelters that continues to meet weekly via video conference to share core content and allow staff to ask questions and gain the inspiration and clarity needed to make lasting transformation with the stopgap tools being offered.

Over **2,000** animal shelters have registered for our learning modules and downloaded Covid management resources. As we continue to weather this crisis and animal shelters across the country experience an uptick in the number of animals being surrendered to the shelter, the KSMP remains committed to providing shelters the resources they need to serve their communities safely and, when possible, find innovative ways to keep pets and their people together.

The Million Cat Challenge gives cats space during COVID

When many animal shelters temporarily scaled back to emergency-only services and the community simultaneously stepped up in droves to foster animals, presenting a unique opportunity to retrofit temporarily empty cages that do not meet welfare standards, the Million Cat Challenge contacted every industry partner they could think of to help seize the moment.

It is hard to believe that a solution as simple as a hole in the cage wall has been called “the smartest thing we’ve done in the last decade”—but it is true. “We have seen and documented the power of portals for years,” says Million Cat Challenge co-founder Dr. Kate Hurley. “Now that many shelters have been able to expand their foster capacity during Covid, we know it’s a good time to install portals in those empty cages.”

In a matter of weeks, the program was able to raise **\$126,000** to purchase cat portals. They sent a call out to every Million Cat Challenge shelter able to move quickly to install the portals in their empty cages and received application requests totaling 7,806 portals!

While they haven't yet been able to fund them all, **120** shelters have received **3,662** portals completely free of cost and the program is continuing to look for additional resources that would allow every shelter the opportunity to expand their cage size to a minimum of 8 square feet, the floor space needed to allow cats to eat, drink and sleep separately from where they eliminate.

The Million Cat Challenge is the world's largest feline life saving initiative. To date, the program has helped over 1,600 North American shelters provide better housing and improve welfare for the animals in their care. In January 2021, the campaign will pass the **3,000,000** lives saved mark.



FY 2019-20: Over 1,600 shelters are on the brink of crossing the 3M lives saved mark together!



Center for Companion Animal Health

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OUR MISSION: To improve the health of companion animals by encouraging and supporting academic studies and clinical research on diseases affecting dogs, cats and other small pets. We are committed to developing and supporting programs that benefit pets and their owners. By doing this, we directly impact animal health.

