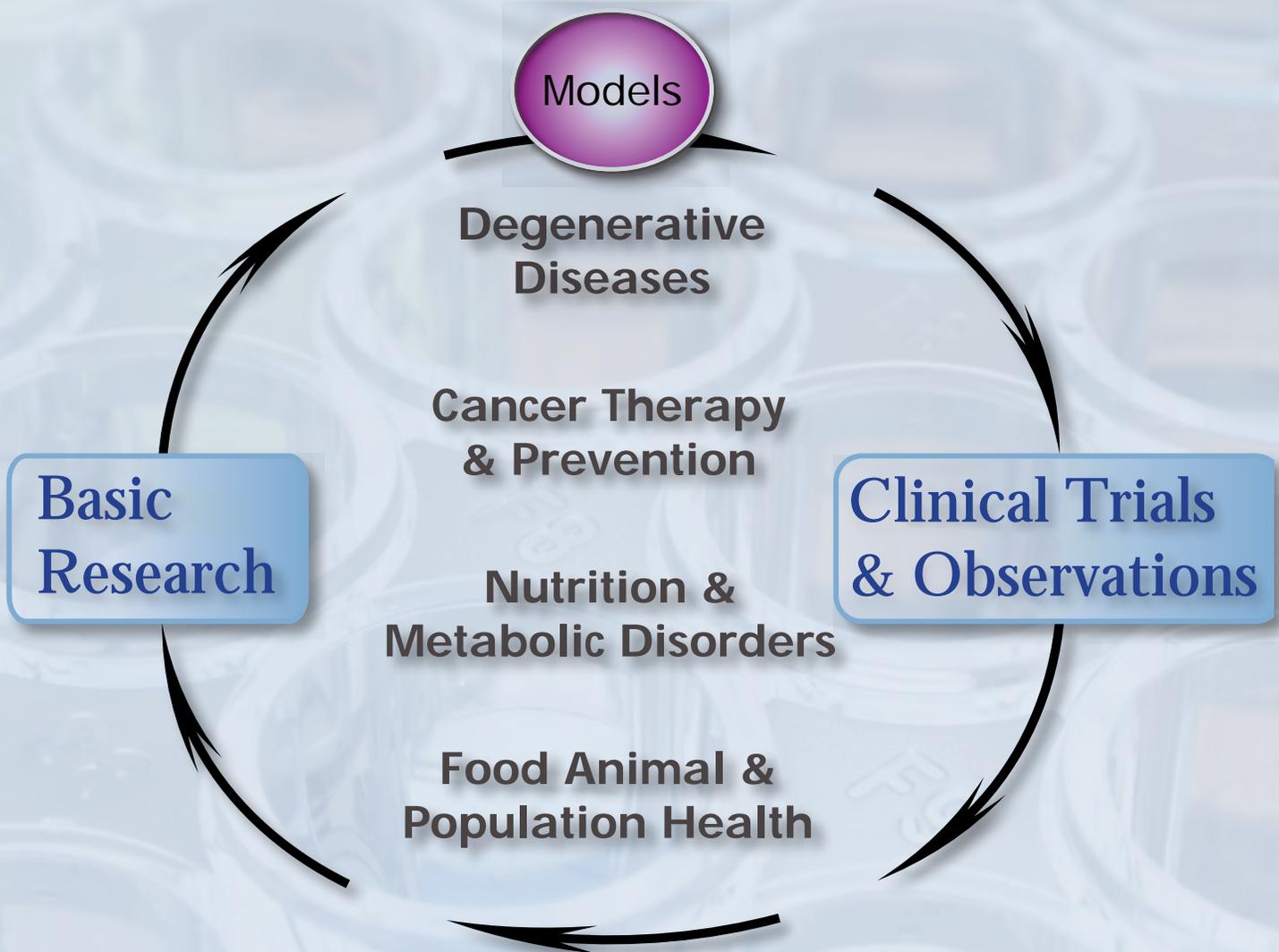


Center of Excellence in Livestock Diseases and Human Health

2007 Annual Report



Center of Excellence in Livestock Diseases and Human Health Annual Report 2007

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Message from the Center of Excellence

We are pleased to present the 2007 annual report for the Center of Excellence in Livestock Diseases and Human Health. Along with benchmark data for fiscal years 2003-2007, this report includes highlights of faculty research projects funded by the center in 2007.

During 2007, the center supported the research efforts of 18 different faculty who were engaged in research that ultimately will benefit the citizens of Tennessee, the nation, and the world, as well as affect the economy at both the state and national levels. Center faculty have made significant advancements in cancer biology, molecular physiopathology, host defense, and disease transmission. Center faculty have also made significant advancements in the prevention and treatment of infectious and non-infectious livestock diseases that affect agricultural productivity.

Productivity among center faculty has been outstanding during 2007. External funding decreased slightly from \$20,666,950 in 2006 to \$20,412,786, in part because of the decrease in federal funding (the National Institutes of Health are operating below their 2005 budget level). However, despite a \$765,886 center decrease in federal funding, center faculty ambitiously sought and obtained \$4,165,245 in industry and private/foundation funding (an increase of \$511,722 since 2006) to continue ongoing projects and begin new ones. Research expenditures continued to stabilize at \$3,430,059 in 2007. The one-year return on the state's investment in the center as the ratio of research expenditures to the state's appropriation is 6.3:1.

Center faculty continue to garner national and international recognition for their research and scholarship. During 2007, center faculty published 62 peer-reviewed articles and gave 58 invited presentations at regional, national, and international meetings.

We are proud of the progress made by center faculty, and we hope you enjoy this summary presentation of center activities and accomplishments.

Michael J. Blackwell, Dean
Robert N. Moore, Director



L-R: Misty Bailey, Michael J. Blackwell, and Robert N. Moore

Comparative Summary of Accomplishments

Benchmark	2007 (18 faculty in center)	2006 (20 faculty in center)
Publications*		
Peer-Reviewed Articles	62	79
Books or Book Chapters	11	7
Abstracts or Posters	42	24
Presentations*		
International	20	18
National	25	31
State or Local	13	13
Research Monies^H		
External Funding	\$20,412,786	\$20,666,950
Research Expenditures	\$3,430,059	\$3,923,521
Return on Investment	6.3:1	7.5:1
* Based on calendar year through report publication date		
^H Based on fiscal year		

The **FUTURE** of biomedical and veterinary research
ERLUBE

Dissemination Research

58

Presentations

Worldwide research dissemination via invited presentations

62

Articles

42

Abstracts or Posters

11

Books & Chapters

Introduction

The center was created in 1984 to promote interdisciplinary activities designed to improve the quality of human life through better animal health; expand livestock disease research capabilities in the College of Veterinary Medicine (CVM) and the Institute of Agriculture; identify and characterize animal diseases that are similar to human disease; and develop new strategies for the diagnosis, treatment, and prevention of disease.

Since 1984, the center has developed successful programs that affect the understanding, treatment, and prevention of livestock and human diseases. These programs predominately focus on molecular and cellular approaches to research in infectious diseases, toxicology, host defense, molecular genetics, and carcinogenesis.

The center has developed investigative strengths along innovative, sophisticated, and contemporary lines in two general areas:

- 1) Animal Models and Comparative Medicine
- 2) Mechanisms of Disease, Pathogenesis, and Immunity

These areas are each highly interrelated, and the center plays a critical role in developing these focused areas of strength in both the CVM and the Institute of Agriculture.

Personnel

Dr. Robert N. Moore, Professor and Associate Dean for Research and Graduate Studies, continues as director of the center. No changes have occurred in personnel.

Accomplishments

Center faculty continue to make excellent progress in ongoing projects, gaining national and international recognition for their expertise and accomplishments. Details of current faculty research are provided in the Faculty Reports section. Despite a decrease in federal funding throughout the country, center accomplishments for 2007 were excellent in terms of benchmarks and extramural funding base. Center researchers are compensating for the lack of federal funds by seeking and receiving more awards from foundations, industry, and other private entities.

External funding:
\$20,412,786
New grants:
\$3,760,462

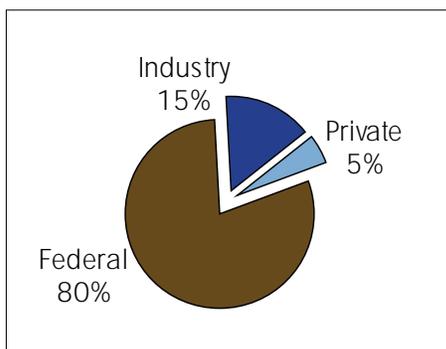


Fig. 1. External funding by category—2007

The 18 center faculty averaged 4 peer-reviewed publications (73 total) and 3 invited presentations (58 total) at prestigious national and international meetings. See Publications and Presentations for details.

The return on the state's investment in the center was 6.3:1, calculated as ratio of expenditures from extramural funding to center appropriation. Extramural funding totaled \$20,412,786 this year. The total funding includes new, multi-year awards for Drs. Baek, Frank, and Xu, totaling \$3,233,447; and new, one-year awards for Drs. Andrews, Frank, Kania, Kirk, Oliver, and Tobias, totaling \$527,015. Research expenditures continued to stabilize at \$3,430,059. See "Research Funded Externally" and "Research Expenditures" on p. 9 for the fiscal year 2007 data summary.

Research Funding* Externally FY 2007

Investigator	Federal	Industry	Foundation/ Private	Totals
Andrews, Frank		\$56,740		\$56,740
Baek, Seung Joon	\$1,366,831		\$522,000	\$1,888,831
Brian, David	\$1,735,219			\$1,735,219
Cui, Mei-Zhen	\$1,002,400	\$547,397		\$1,549,797
Frank, Nicholas		\$136,821	\$125,207	\$262,028
Kania, Stephen	\$22,206		\$23,769	\$45,975
Kirk, Claudia		\$140,154	\$42,051	\$182,205
Oliver, Stephen	\$340,000	\$857,726		\$1,197,726
Pighetti, Gina		\$30,000		\$30,000
Plummer, Howard		\$752,989		\$752,989
Rouse, Barry	\$3,572,969			\$3,572,969
Schuller, Hildegard	\$3,350,536			\$3,350,536
Schultz, T.W.	\$1,988,630		\$10,000	\$2,008,630
Tobias, Karen		\$7,105	\$12,960	\$20,065
Wang, Hwa-Chain Robert	\$100,000	\$633,326	\$27,000	\$760,326
Xu, Xuemin	\$2,768,750		\$240,000	\$3,008,750
Totals	\$16,247,541	\$3,162,258	\$1,002,987	\$20,412,786

* Represents total, all-years funding for active grants and contracts

Research Expenditures FY 2007

Investigator	Federal	Industry	Foundation/ Private	Totals
Andrews, Frank		\$17,007		\$17,006
Baek, Seung Joon	\$386,866		\$131,153	\$518,019
Brian, David	\$366,973			\$366,973
Cui, Mei-Zhen	\$242,699	\$187,235		\$429,934
Frank, Nicholas		\$3,561	\$20,467	\$24,028
Kania, Stephen	\$8,519		\$13,834	\$22,353
Kirk, Claudia		\$14,384	\$7,215	\$21,599
Oliver, Stephen	\$71,939	\$413,543		\$485,481
Pighetti, Gina		\$11,495		\$9,196
Plummer, Howard		\$216,332		\$216,332
Rouse, Barry	\$625,262			\$625,262
Schuller, Hildegard	\$205,626			\$205,626
Schultz, T.W.	\$207,743			\$207,743
Tobias, Karen		\$5,137	\$2,235	\$7,372
Wang, Hwa-Chain Robert	\$16,145	\$124,950		\$141,095
Xu, Xuemin	\$57,665		\$72,074	\$129,739
Totals	\$2,189,437	\$993,644	\$246,978	\$3,430,059

Allocation of Funding

The Center of Excellence in Livestock Diseases and Human Health supports investigators and promotes research through a variety of mechanisms. Although it is not a primary source of research funding, the center facilitates established investigators' efforts to maintain and expand their research programs and promotes new investigators' potential to develop competitive research programs.

Research and Graduate Programs Advisory Committee's three main criteria for funding:

- 🔗 Scientific merit
- 🔗 Potential to lead to extramural funding
- 🔗 Relevance to the center's objectives

Center faculty consist of senior members who have research interests in line with center objectives and a strong history of securing external funding using center funds. Junior members are those who have received seed money or bridge funding, or new faculty who have received start-up funds. Junior members are expected to secure external funding within two years; members who fail to secure such funding will be placed on probation for one year. If, at the end of the probationary period, external funding has not been secured, the member will be dismissed from the center.

Start-Up Funding

The center provided start-up funds for three faculty to secure additional external funding. Drs. Michael Fry, Maria Prado, and Jeffrey Phillips were awarded a total of \$60,155.

Dr. Fry's research involves developing a procedure for measuring canine and human iron metabolism via the protein hepcidin. Dr. Prado studies how pathogenic bacteria react with the host and cause disease, particularly *Mannheimia haemolytica* in cattle. Treating advanced cancer in companion animals by using a killer T-cell line is the focus of Dr. Phillips's work.

Infrastructure

The center promotes the research infrastructure of both the CVM and the Institute of Agriculture through the purchase and maintenance of essential research equipment. The Research and Graduate Programs Advisory Committee reviews equipment requests based on three criteria: justification of need, current availability of equipment, and number of investigators who may benefit. During fiscal year 2007, the committee authorized \$44,681 toward the purchase of three pieces of equipment. A DNA analysis system is currently being used by Dr. Jeffrey Phillips and several other researchers, not only to increase speed and flexibility in treating canine cancers, but also to analyze a variety of other disorders. Dr. David Brian's laboratory personnel are using an ultra-low temperature chest freezer to store biological material, and the immunology laboratory received funding to purchase a thermal cycler, which performs polymerase chain reactions that amplify DNA. The latter equipment grant benefited nearly every investigator in the college, including clinicians.

\$80,935 helped fund equipment and service contracts

In support of the CVM's research enterprise, the center funded service contracts for three pieces of equipment purchased previously with COE funds. These contracts totaled \$36,254.

Seminars and Sponsored Lectures

Cheryl London, "Kinase Dysfunction in Canine Cancer"

Associate Professor of Veterinary Biosciences

The Ohio State University College of Veterinary Medicine

Microbiology Course Seminar Series

Stewart Cole, "From Swamps to Schwann Cells: A Genomic Approach to Evolution of Pathogens"

Director, Bacterial Molecular Genetics Unit

Pasteur Institute

Brigitte Gicquel, "Host Pathogen Interactions During Infection by Mycobacterium tuberculosis"

Director, Mycobacterial Genetics Unit

Pasteur Institute

John Gunn, "Host Sensing and Bacterial Surface Modifications are Important for Salmonella in vivo Survival"

Associate Professor of Molecular Virology, Immunology, and Medical Genetics

Division of Infectious Diseases, The Ohio State University College of Medicine

Vivek Kapur, "Translational Research in Microbial Pathogenomics"

Professor of Microbiology

University of Minnesota

Mercedes Pascual, "Vibrio cholera"

Associate Professor of Ecology and Evolutionary Biology

University of Michigan

Bala Swaminathan, "Foodborne Disease Surveillance and Outbreak Investigations: Two Decades of Progress"

Chief, Foodborne and Diarrheal Diseases Laboratory Section

Centers for Disease Control

John Timoney, "The Pathogenesis of Strangles and the Origin and Biology of Streptococcus equi"

Keeneland Chair in Equine Infectious Diseases, Gluck Equine Research Center

University of Kentucky

Comparative and Experimental Medicine Course Seminar Series

Dr. Steve Safe, "Development of New Mechanism-Based Drugs for Cancer Chemotherapy"

Distinguished Professor, CVM, Department of Veterinary Physiology and Pharmacology

Texas A & M University

Dr. Michael Wargovich, "Chemoprevention of Colon Cancer By Anti-inflammatory Traditional Medicinal Plants"

Professor and Director, Department of Pathology and Microbiology

University of South Carolina

Dr. Susan Fischer, "COX-2 and Beyond —Critical Determinants for Skin Cancer Development"

Professor, Department of Carcinogenesis

University of Texas M.D. Anderson Cancer Center

Dr. Chung S. Yang, "Tea and Cancer Prevention: Molecular Mechanisms and Human Relevance"

Professor, College of Pharmacy, Department of Chemical Biology

Rutgers University

Dr. Carol A. Heckman, "Cancer Cell and Cytoskeleton"

Director, Center for Microscopy and Microanalysis, and Professor of Biological Sciences
Bowling Green State University

Dr. Patrick Stover, "Folic Acid, Cancer and Birth Defects: Managing Genome Stability and Expression"

Professor & Division Director, College of Human Ecology
Cornell University

Dr. Gary Stoner, "Prevention of Gastrointestinal Tract Cancers with Berries and Berry Components"

Distinguished Professor
Ohio State University

Dr. Rong-Fong Shen, "Proteomics in Biomedical Science"

Director, Proteomics Core Facility
National Heart Lung and Blood Institute, NIH

Dissemination of Research

The center contributed \$5,499 for six researchers to present at national-level scientific meetings. For scientific, peer-reviewed journal articles, the center gave two faculty members a total of \$2,739 to offset publication charges. A complete list of faculty publications and presentations for the 2007 calendar year can be found in the Publications and Presentations section. Faculty are encouraged to share their research by speaking to professional groups, community groups, and civic groups. In addition, the CVM issues press releases to state, regional, and national media, resulting in numerous television and print features, many of which relate directly to research conducted through the center. The three CVM news publications are available on the CVM Web site (<http://www.vet.utk.edu/>), which also provides an overview of the types of research conducted by CVM and COE faculty.

Center of Excellence Summer Student Research Program

In an effort to foster interest in careers in biomedical research, the center helped provide opportunities for 20 veterinary students to perform research within the College of Veterinary Medicine during the summer.

In addition to laboratory and field research, students attend a week of professional development seminars, during which guest speakers address topics such as career opportunities in research, compliance issues in lab animal care, scientific writing, and the grant proposal process.

Near the end of the 10-week program, the students present their research findings to their colleagues and to CVM faculty as well as prepare a scientific abstract.

To maximize student participation, the program is open to both center and non-center faculty. During fiscal year 2007, four COE faculty participated in the program. The center will continue to encourage participation of center faculty.

The students involved in the summer research program and a brief description of their activities follow:

A graduate of the University of Connecticut with a B.S. degree in animal science and pathobiology, **Lora Abbott** studied under the direction of Dr. Frank Andrews. Lora, a third-year student from Knoxville, studied the causes of gastric ulcer diseases in horses. She used an Ussing chamber and real-time polymerase chain reaction to study the effect of volatile fatty acid concentration on acid injury in the non-glandular equine stomach. After graduating, Lora hopes to practice equine medicine and eventually turn to academic teaching and research.

Jennifer Bernard is a second-year student from Germantown, and she attended nearby Christian Brothers University in Memphis, where she earned a B.S. in biology with a minor in chemistry. This summer, Jennifer assisted Dr. Melissa Kennedy in using real-time polymerase chain reaction and indirect fluorescent immunoassays to look at the prevalence and epidemiology of feline coronavirus infections in captive and free-ranging cheetahs in South Africa. She did this work at the University of Pretoria in South Africa. Ultimately, Jennifer would like to work in zoo medicine, virology, and infectious/zoonotic diseases.

A graduate of UCLA with a B.S. in computer science, **Thomas Chen** worked with Dr. Daniel Ward to assess tear dynamics in horses. Thomas is a third-year student from San Francisco, CA. Horses are prone to a variety of corneal diseases that typically require intensive treatments with topical ocular drugs. Tears serve as a reservoir for these drugs, but the dynamics of tears have not been measured and quantified as in humans. Investigators like Thomas hope that learning how tears behave in the equine eye will lead to a better understanding of corneal disease in horses and improve ocular therapy.

Martha G. Cline is a second-year student from Nashville, where she earned a B.S. from Lipscomb University in biology with minors in chemistry and philosophy. Dr. Susan Lauten was Martha's mentor this summer. The two of them worked together to design and prepare a nutrition study and have written a grant proposal in hopes to further fund the study. Melissa also assisted Dr. Lauten with several nutrition consults regarding weight loss. These skills will serve her well in the small animal field, where her interests lie. Her goals are to complete an internship after graduation and possibly a residency.

A student in his third year, **Tony Greer** is a native of Kingsport. At the University of Tennessee, he earned a B.S. degree in animal science, and this summer, he worked with Dr. Tom Doherty to investigate different minimum concentration values for two commonly used anesthetic drugs in veterinary medicine: sevoflurane and isoflurane. Tony plans to pursue a career in large animal medicine with a concentration in food animal production.

Becky Costello, a second-year student from Warminster, PA, studied animal science at the University of Maryland, where she earned a B.S. degree. Becky worked with Dr. Alfred Legendre designing a study for the treatment of *Aspergillus terreus*, a type of fungal infection in dogs, with posaconazole, an anti-fungal drug. She not only researched the topic, but also wrote a proposal requesting posaconazole donations for the study. In addition, she helped develop protocol for the study and worked on writing a grant for further funding. Becky is interested in pursuing a career in exotic animal medicine and nutrition.

A native of Milwaukee, WI, **R. Reid Harvey** studied Hispanic literature at the University of Tennessee. Now a second-year student, Reid worked this summer with Dr. John New and Teresa Jennings (director of Companion Animal Initiative in Tennessee). He helped in an ongoing Shelter Population Index study to track the numbers of shelter dogs and cats throughout the country. In addition, Reid observed feral cats in the area and estimated population using a wildlife statistical package. He is in the parallel degree program to obtain an M.P.H., and he hopes to earn a Ph.D. in veterinary epidemiology and begin a career with either the C.D.C. or an international organization like the U.N. or W.H.O.

A graduate of the University of Tennessee with a B.S. in biology, **Lauren Hiatt** is a Chattanooga native. This second-year student worked with Dr. Stephen Kania this summer to develop a polymerase chain reaction test that can distinguish between the three major Staphylococcal species in veterinary medicine: *S. aureus*, *S. intermedius*, and *S. schleiferi*. Lauren is interested in a future in veterinary public health or laboratory animal medicine.

Carolyn Elise Jones, a second-year student from Nashville, earned a B.S. in animal science with a minor in biology from the University of Tennessee. Dr. Charles Faulkner served as her mentor for a study of internal parasites in passerine birds in the Great Smoky Mountain National Park. She gained valuable skills such as laboratory diagnostic procedures, bird and parasite identification, microscopy techniques, microscopic photography, bird handling, and data management. Upon graduation, Elise wants to develop a large animal private practice.

Working with Dr. Steve Adair this summer was **Virginia Kiefer**, second-year student from Rocky River, OH. Virginia earned a B.A. degree in zoology (minor in neuroscience) with university honors from Miami University of Ohio. Her research project involved the pharmacodynamic and pharmacokinetic effects of Domperidone in horses. The guiding hypothesis of the study is that Domperidone will cause an increase in blood flow in the hooves. Therefore, the clinical significance is the possible use of the drug for the prevention or treatment of laminitis, a crippling disease of horses. She would like to eventually work at a veterinary teaching hospital, combining her interests of clinical practice, teaching, and research.

Melissa Mustillo is a third-year student from Knoxville. She earned a B.S. degree from Canisius College in Buffalo, NY, where she majored in biology and minored in classics. This summer, Melissa worked with Dr. Joe Bartges on a project that dealt with nutrition and the formation of urinary tract stones in cats. She formulated specific diets for the cats, weighed them weekly, and then collected their urine to test its saturation for calcium oxalate. After graduation, she wants to complete a small animal internship and then find a job in a medium-sized veterinary hospital.

Former Memphis resident **Norman P. Nolen II** is a graduate of Tuskegee University. He majored in animal and poultry science with minors in both chemistry and biology. This summer, Dr. Hwa-Chain Robert Wang served as his mentor in testing the effectiveness of chemo-preventive and chemo-therapeutic drugs on naturally occurring tumors using a dog model. Paul's career interests are lab animal medicine, infectious diseases, and public health.

A native of Cleveland and now in her second year, **Jayne Peck** earned a B.S. in biology with a minor in chemistry from Barry University in Miami Shores, FL. She worked with Dr. Melissa Kennedy at the University of Pretoria in South Africa on a feline coronavirus project. Jayne is interested in doing research in virology and working in a mixed animal practice, with a neurology specialization.

Kelly A. Perdue, a third-year student from Kingsport, earned a B.S. from Berry College, where she majored in animal science and minored in biology and chemistry. Under the direction of Dr. Nicholas Frank, Kelly ran frequently-sampled intravenous glucose tolerance tests on horses to examine the link between glucose, endotoxemia, and laminitis. Her career goal is to focus primarily on large animal medicine.

Third-year student **Holly Peters** hails from Lexington, KY, and has a B.S. in animal science from the University of Kentucky. Holly worked with Dr. Sharon Patton this summer to estimate the prevalence of endoparasites in ownerless cats of eastern Tennessee. She plans to pursue a career in zoological medicine.

With a B.A. degree in biology from The Colorado College in Colorado Springs is second-year student **Ashley Portmann**. Ashley is a native of Knoxville, and she worked with Dr. Sarel Van Amstel on her COE llama project. Her research involved evaluating ivermectin (an anti-parasitic medication) levels in the blood and cerebrospinal fluid of llamas after injection. She did literature searches, data collection, and presentation of the work. After graduation, Ashley wants to establish herself in small ruminant medicine or small animal medicine.

Karen-Anjali Pye Sanon is a second-year student from Knoxville. She earned a B.A. in social science and studio art from Fordham University in New York, but she also studied in the pre-medicine program there. Dr. Dave Rotstein was Anjali's mentor this summer in writing a paper for publication in the Journal of Wildlife Diseases. The paper's topic is a cetacean stranding that occurred in 2005. This stranding was a unique event that allowed them to explore not only possible causes of the stranding, but also to compile data for a broader database to be used for comparison purposes and to give more detailed information on the species. Anjali's career interests lie in global wildlife conservation.

A student in her third year, **Marisa Etta Shulman** is from Bell Buckle, and she earned a B.S. in biology with a minor in theater from the University of the South in Sewanee. Dr. Sharon Patton mentored Marisa in two projects dealing with ownerless cat populations in eastern Tennessee. They surveyed fecal samples to assess the prevalence of numerous endoparasites. They also performed serological tests on serum collected from feral cats and studied the prevalence of *Toxoplasma gondii* and *Dirofilaria immitis* using antigen and antibody tests. Marisa's goal for the summer is to publish her data in a peer-reviewed journal and present her information at a veterinary conference. Eventually, she would like to complete an internship.

Working with Dr. Barton Rohrbach is second-year student **Rebekah Skye Willis**. This Morganton, NC, native earned a B.S. in animal science with a minor in genetics and nutrition from North Carolina State University. Rebekah analyzed results and wrote about the findings of a long-term project on Equine Cushing's Disease (ECD). The findings suggested that there are no diagnostic factors that can predict the prognosis of a horse with ECD. Lifespan was also unaffected by the duration of disease prior to diagnosis. Rebekah speculates that she will enter large animal medicine upon graduation.

Benjamin Young, second-year student from Knoxville, earned a B.A. from St. John's College, where he majored in philosophy and minored in the history of mathematics. Ben worked with Dr. Joe Bartges this summer to investigate the effects of a commonly-prescribed supplement on the risk of calcium oxalate stone formation in cats. He evaluated the changes in urine electrolytes and minerals, urinary excretion of calcium oxalate, and glycosaminoglycan levels. Benjamin's interest lies in small animal medicine, but his research experience this summer has piqued an interest in a career in research and academia.

Five-Year Benchmark Data

- Total funding increased 21.8%
- Total expenditures increased 8.6%

Productivity among center faculty has been outstanding during the last five-year period. From 2003-2007, center faculty published 455 articles in peer-reviewed journals and gave 237 invited presentations at national and international meetings. In addition, total external funding increased from approximately \$16.7 million in 2003 to \$20.4 million in 2007. Funding from industry, foundations, and other private sources increased from approximately \$2.3 million in 2003 to \$4.1 million in 2007. Furthermore, research expenditures increased from \$3.1 million in 2003 to \$3.4 million in 2007. The five-year average return on the state's investment in the center is 6.9:1, the ratio of research expenditures to the state's appropriation. For comparison, benchmark data from 2003-2007 are summarized in Figs. 2-4.

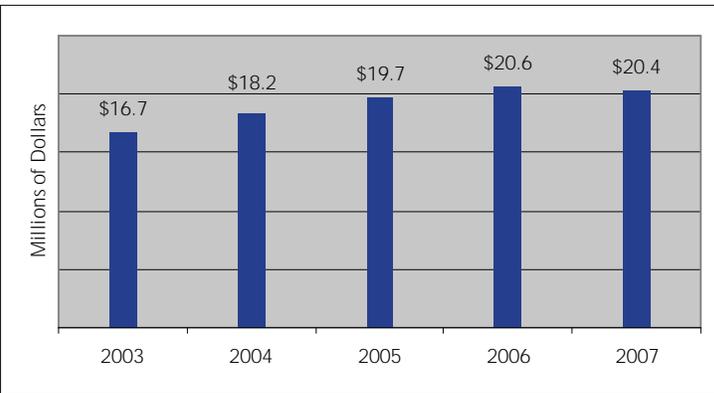


Fig. 2. Total external funding by fiscal year

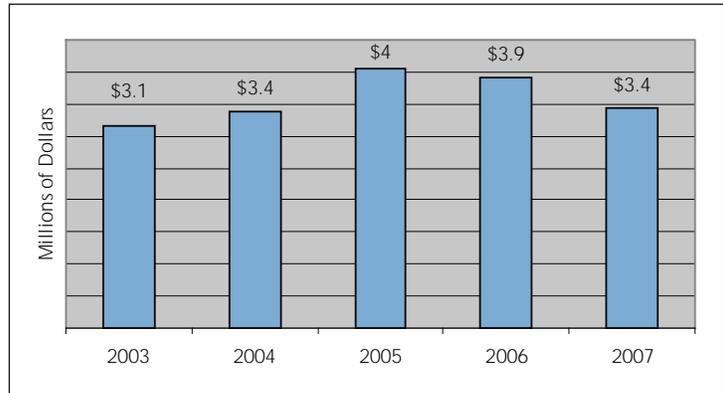


Fig. 3. Research expenditures by fiscal year

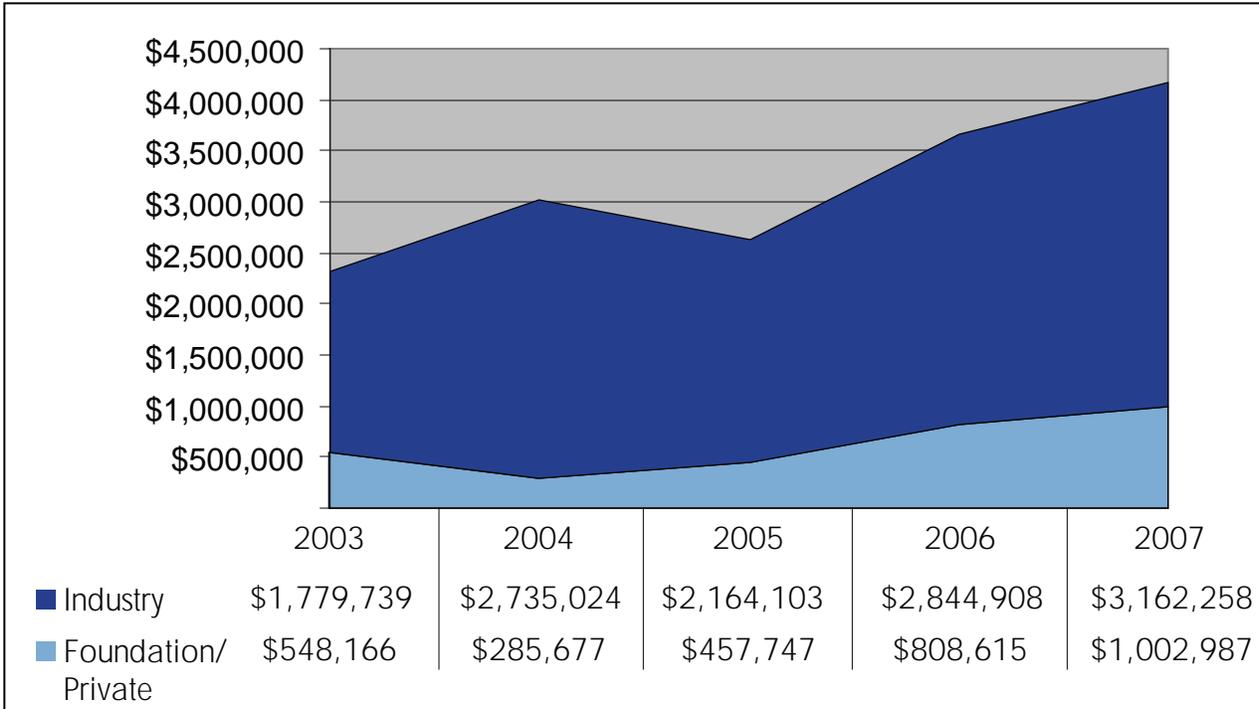


Fig. 4. Industry and foundation/private funding by fiscal year.

Future Plans

The center will continue to concentrate on developing newly recruited investigators while promoting initiatives to enhance its research capacity and direction. This year (FY08) the center will expend approximately \$390,000 to fund 15 projects in the College of Veterinary Medicine and the Department of Animal Science. The center will continue to support core facilities for flow cytometry/cell sorting and tissue culture.

To help recruit and retain top quality veterinary and graduate students, the center will continue to increase its involvement in research training to provide increased opportunities for summer internships, matching travel grants, and stipend upgrades. The center will continue to offer invited speaker courses to increase national and international exposure of the center's faculty, students, and programs; and at the same time enhance the potential for developing external collaborations for our faculty and postdoctoral opportunities for our students. As part of this effort, during FY08, the center will sponsor invited speakers for a timely graduate-level course in laboratory animal use and pathology.

Concurrent with the enhanced funding of center faculty, the College of Veterinary Medicine has seen dramatic growth in extramural support over the past six years. Those results were accomplished during the college's preceding 5-year strategic plan. That plan created a supportive infrastructure for research, helping to drive almost a 3-fold increase in research funding. The center played a key role in the preceding plan. The current strategic plan (2007-2011) further promotes research, including the development of emphasis areas and a strategy to enhance the national prominence of CVM research. Identified emphasis areas and initiatives represent the overall direction of CVM research (see Fig. 5). A major point of importance is that the emphasis areas and initiatives are shared college-wide and not restricted to departments. In addition, the plan emphasizes translational research that promotes the collaborative interaction of clinical and basic investigators to facilitate creation and movement of basic biomedical knowledge to the clinical arena. Again, the center will play a key role in promoting these collaborative interactions.

The center has a long history of promoting translational research, and it will continue to promote and pursue collaborative projects with other units to enhance research that supports its objectives. Ongoing collaborations include established efforts with the Tennessee Agriculture Experiment Station, the Food Safety Center of Excellence, the Center for Environmental Biotechnology, and the Department of Nutrition. The center will also continue to promote a developing collaboration with investigators in the Graduate School of Medicine involving advanced imaging technology using positron emission tomography. This PET/CT initiative is having impact on the college's cancer therapy and prevention emphasis area and promises to influence clinical research in other areas.

Bio- and agro-terrorism continue as issues of national concern. Therefore, the center will continue to support public health oriented initiatives designed to support surveillance, intervention, and resolution of potential attacks directed against humans and food animals. To this end, the center will co-sponsor workshops designed to train and certify key personnel likely to respond to an agricultural incident.

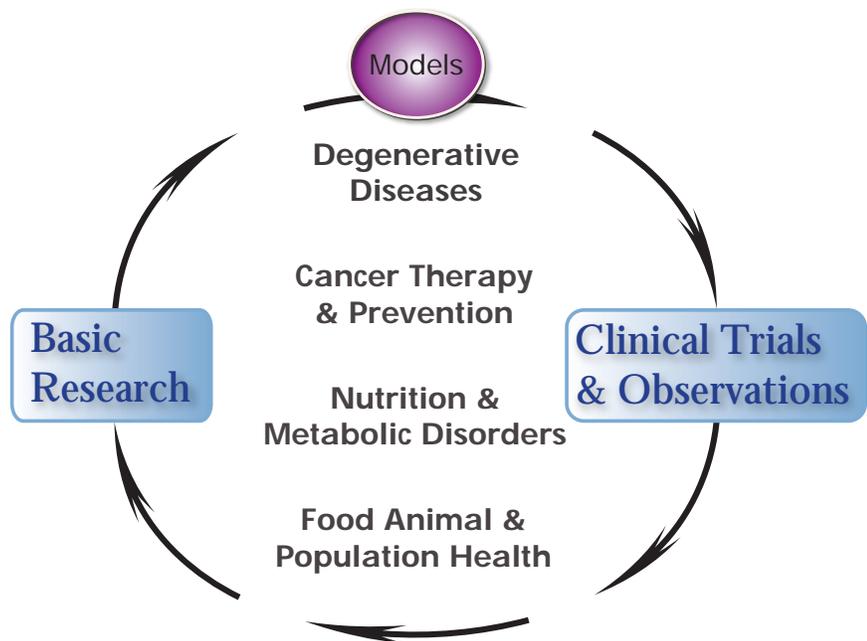
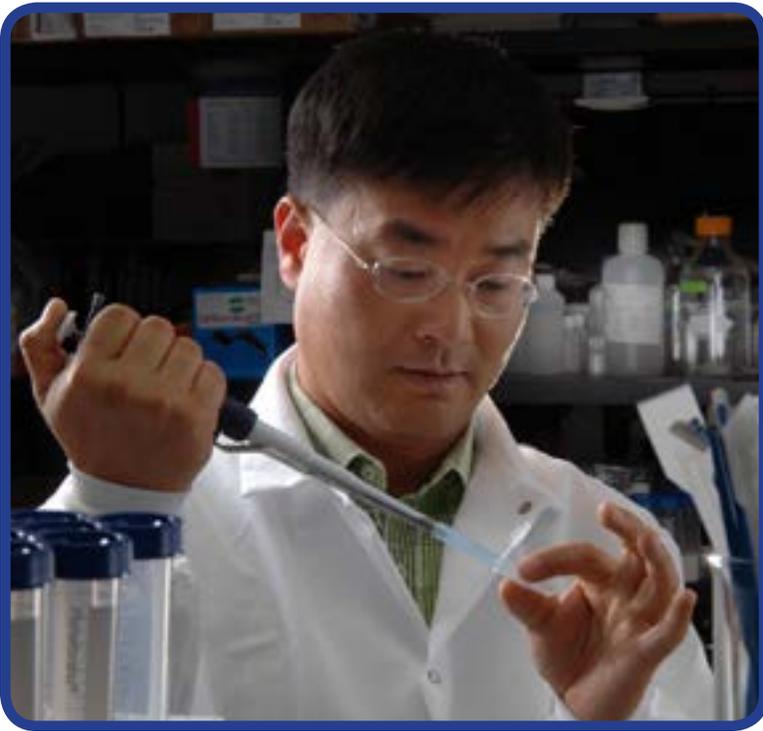


Fig. 5 CVM research strategic plan



Seung Joon Baek

Assistant Professor
Pathobiology Department

PhD, University of Maryland

Five refereed publications in 2007

In addition to center funds, Dr. Baek's research is supported by the National Institutes of Health and the American Cancer Society.

Effects of NSAIDs on Human Colorectal Cancer Cells

Nonsteroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen and aspirin, are well known for treating inflammatory diseases like arthritis. These NSAIDs work by inhibiting cyclooxygenase (COX), an enzyme known to cause inflammation and pain. Less known, and the focus of Dr. Baek's studies, is the effect NSAIDs have on the development of human colorectal and other cancers.

Dr. Baek's research team has preliminary evidence that NSAIDs work to prevent cancer not by inhibiting COX, but by inducing the expression of a gene in the body that may cause cancer cell death. The effect of this gene (NAG-1 [nonsteroidal anti-inflammatory drug activated gene]) on cancer cell

death and how the gene responds to NSAIDs to initiate cell death comprise Dr. Baek's research. Specifically, his laboratory is investigating the NSAID sulindac sulfide and its ability to induce gene expression.

This year, Dr. Baek expanded his studies to include two other potential target genes, both that were expressed even more than NAG-1 when exposed to NSAID treatment. These preliminary results suggest that other genes are also involved in sulindac sulfide's anti-cancer effects.

The results of Dr. Baek's research may lead to the development of a new family of anti-cancer drugs.

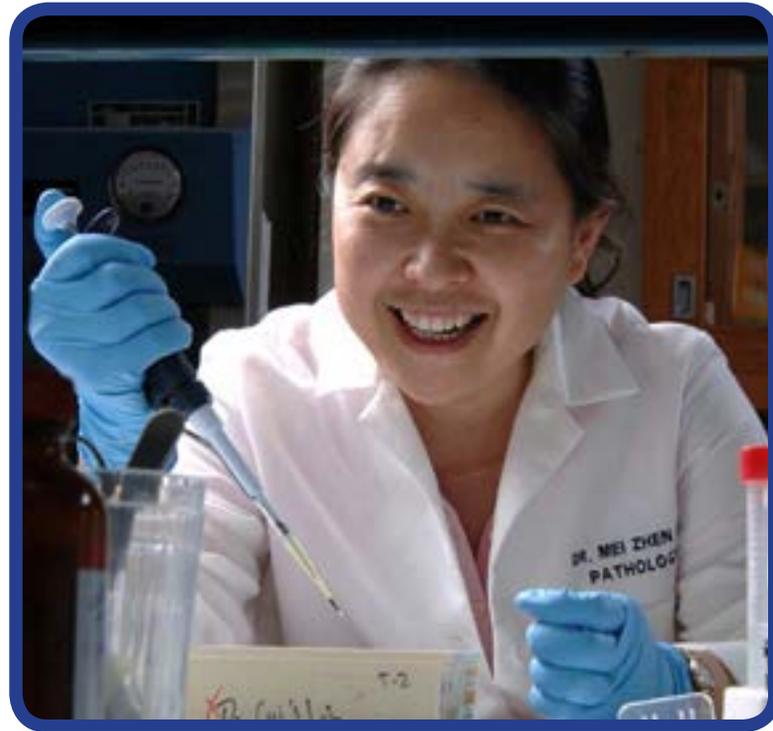
Mei-Zhen Cui

Associate Professor
Pathobiology Department

PhD, Tokyo Institute of Technology, Japan

Two refereed publications in 2007

In addition to center funds, Dr. Cui's research is supported by the National Institutes of Health and Philip Morris.



The Role of Lysophosphatidic Acid in Atherosclerosis

Dr. Cui's research team is investigating the causes of atherosclerosis, or the build-up of plaque in arteries that can reduce blood flow or cause arteries to rupture, sometimes resulting in a heart attack or stroke. The disease was estimated to affect 79.4 million Americans in 2004, and in 2005, Tennessee ranked third in the nation for deaths due to heart disease.

An early growth receptor gene (Egr-1) plays a key role in vascular injury, and Dr. Cui has found, via *in vitro* studies, that lysophosphatidic acid (LPA) likely affects Egr-1 expression. Although LPA's role in atherosclerosis is unclear, it is one known substance that comprises the plaques that accumulate

on the inner-most layer of the artery wall. Dr. Cui's laboratory recently discovered that LPA markedly increases Egr-1 gene expression in the cells that make up the *middle* layer of the artery wall.

During the past year, Dr. Cui has studied LPA's effect on Egr-1 using *in vivo* techniques in a mouse model. Her research may lead to the identification of new therapeutic targets to prevent and cure vascular diseases.



Madhu S. Dhar

Research Associate Professor
Large Animal Clinical Sciences Department

PhD, University of Poona, India

The Link Between Obesity, Insulin Resistance, and Cancer

Approximately 65% of adults in the United States are obese. Most Americans recognize obesity as a contributor to heart disease and insulin resistance, which coincides with diabetes. However, obesity is less known to also be related to cancer.

Dr. Dhar seeks to understand the association between obesity, insulin resistance, and cancer. She has developed a mouse model by which to study the effects of combined genetic- and diet-induced obesity and type II diabetes on cancer, and she hypothesizes that as insulin resistance and obesity progresses in these mice, their potential to develop cancer will increase.

Specifically, Dr. Dhar's research team is looking at cancer-related genes that may be linked to obesity and insulin resistance. Their preliminary results have directed them to examine the formation of new blood vessels in the pancreas. It seems that the expression of certain genes and proteins aids in the development of this vascular network and its interaction with fatty tissues.

The long-term goal of this investigation is to identify new molecular targets that may eventually be used in cancer prevention, therapeutics, or diagnostics.

Stephen Kania

Associate Professor
Comparative Medicine Department

PhD, University of Florida

Four refereed publications in 2007

In addition to center funds, Dr. Kania's research is supported by UT-Battelle/Oak Ridge National Laboratory, Winn Feline Foundation, and the AKC Canine Health Foundation.



Clarifying the Mechanisms of Staphylococci Multiple Drug Resistance

Physicians often warn their human patients about the possibility of creating drug-resistant strains of bacteria by failing to complete full treatment of an infection with antibiotics. However, mutant strains of bacteria evolve in both humans and animals, and some forms of bacteria are shared between the two.

Both humans and animals are susceptible to staphylococci, but each is susceptible to different strains. The focus of Dr. Kania's research is to identify the source of resistance in three staphylococcus species with strains specific to dogs.

Dr. Kania and his research group hypothesize that the multiple drug resistance

seen in veterinary staphylococci is related mainly to resistance to oxacillin, an antibiotic drug, and that this resistance is spread from other populations of staphylococci. They are studying the genetic backgrounds and mechanisms by which these strains are resistant.

This work could help identify the most effective treatments for staphylococci infections and influence decisions regarding the need for treatment in certain cases. The important information these studies will provide will also prove useful to investigations into staphylococci affecting humans.



Howard K. Plummer, III

Research Assistant Professor
Pathobiology Department

PhD, Bowling Green State University

In addition to center funds, Dr. Plummer's research is supported by Philip Morris.

Intervention of Small Cell Lung Cancer

Lung cancer is the second most common new cancer in the United States, and smoking is its highest risk factor. Small cell lung cancer (SCLC) makes up 10% to 15% of all lung cancer cases and tends to spread throughout the body, making surgery a rare option. For this reason, it is important to develop ways to prevent and treat SCLC.

Dr. Plummer's research team is exploring the effects of a specific type of potassium channel that controls cell function. This G-protein inwardly rectifying potassium channel 1 (GIRK1) is also found in breast cancer, where it is under the control of a receptor that has been shown to regulate the growth of cancer cells. The relationship between

this receptor and GIRK1 in SCLC, however, is unknown.

Dr. Plummer expects to find that the combined effect of GIRK1 and its regulating receptor inhibits the formation and/or progression of SCLC. Knowledge from this study could then be used to develop new therapies to treat SCLC since a component of tobacco initiates cancerous progress via this receptor.

Hildegard Schuller

Distinguished Professor
Pathobiology Department

DVM, Justus Liebig University, Germany

Five refereed publications in 2007

In addition to center funds, Dr. Schuller's research is supported by the National Institutes of Health and the Department of Energy.



Regulatory Mechanisms in Lung Cancer

East Tennessee has one of the highest lung cancer death rates in the country. In an attempt to help combat that problem, Dr. Schuller is focusing on the effects of nitrosamines on the lungs.

Nitrosamines are cancer-causing substances found in nicotine, food, beverages, cosmetics, and drugs. The tobacco-specific nitrosamine NNK reacts with nicotinic acetylcholine receptors (nAChRs) on cells, resulting in hyperstimulation of these receptors, a reaction that causes toxic effects.

In her laboratory, Dr. Schuller has determined that many of nicotine's biological effects may be caused by the interaction of nitrosamines (like NNK) with nAChRs. Like-

wise, other factors in the human environment, such as diet and use of certain cosmetics and medicines, may also heighten the sensitivity of nAChRs, thus increasing the possibility of lung cancer.

Still, a host of factors in the human environment affects the sensitivity of these receptors, making it important to develop tools to identify hyperstimulation in individual patients. Dr. Schuller's research can be used to help design lung cancer prevention and treatment strategies based on that hyperstimulation.



Hwa-Chain Robert Wang

Associate Professor
Pathobiology Department

BVM, National Chung-Hsing University, Taiwan
PhD, University of Virginia

Three refereed publications in 2007

In addition to center funds, Dr. Wang's research is supported by Philip Morris, the National Science Foundation, and the Association of American Veterinary Medical Colleges.

Cell Death Regulation in Cancer Prevention

Programmed cell death (apoptosis) is a basic biological phenomenon whose balance is of crucial importance to maintain cellular stability. A balance of cell death and regeneration is critical to maintain normal tissues and repair wounded ones. An imbalance is the cause of approximately 50% of all major diseases, including cancer.

Most normal cells are anchorage dependent, meaning that they need tissues on which to anchor to survive. Without that anchorage, they will die. However, some cancer cells have developed the ability to survive without being connected to surrounding tissues. These anchorage-independent cells thus block apoptosis and cause cell growth

within tumors.

The focus of Dr. Wang's research is to determine the mechanisms that promote or support cancer cell survivability in these conditions. The results from this study could lead to new therapies for cancer prevention or treatment.

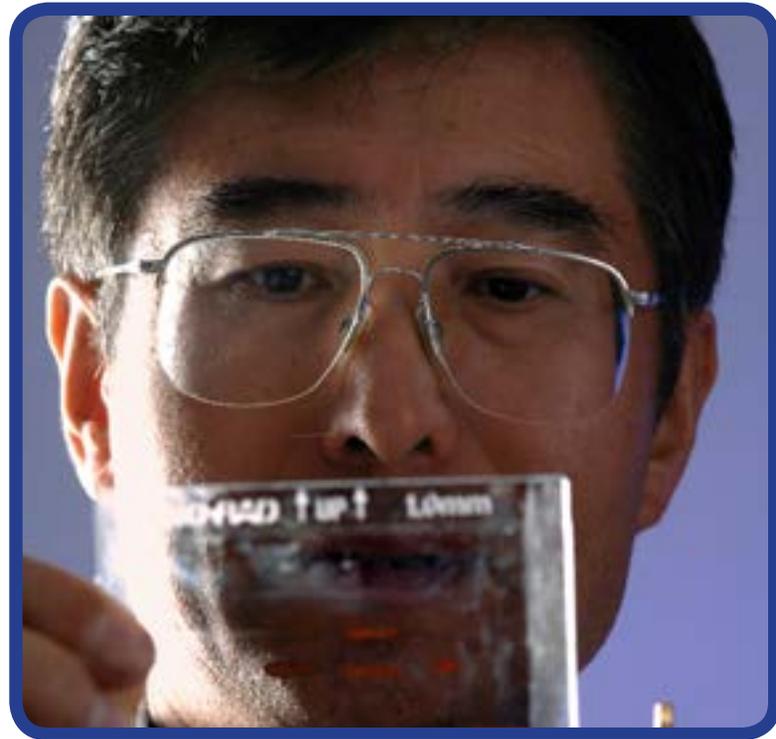
Xuemin Xu

Professor
Pathobiology Department

PhD, Tokyo Institute of Technology, Japan

Two refereed publications in 2007

In addition to center funds, Dr. Xu's research is supported by the National Institutes of Health and the Alzheimer's Association.



Determining Enzymatic Effects on β -amyloid Peptides in Alzheimer's Disease

In 2007, the Alzheimer's Association estimated that 5 million people in the U.S. were living with Alzheimer's disease, the fifth leading cause of death for people over age 65. Unfortunately, most Alzheimer's medications work only for mild to moderate symptoms, creating a need for new types of drugs to treat the disease.

The accumulation of amyloid plaques in the brain is believed to be a causative event in Alzheimer's disease. These plaques are composed of small clusters of β -amyloid peptides (A_n), which link to form proteins. Specifically, A₄₂ is part of a large amyloid precursor protein (APP). The A_n species are organized by scientists by their total number of amino

acids. Most A_n peptides identified so far end at amino acids 40 or 42, but Dr. Xu's research team discovered an A₄₆ and an A₄₉.

A_n peptides are generated when the enzymes γ -secretase and β -secretase split the peptide bonds within the APP. Although investigators believe that γ -secretase is composed of four components, they have not yet determined the functions of these components. Dr. Xu's goal this year was to begin clarifying the components' roles in Alzheimer's disease.

The discovery of these two species provides a new opportunity for drug development targeting these peptides as well as the enzymes γ -secretase and β -secretase.



Frank M. Andrews

Professor
Large Animal Clinical Sciences Department

DVM, MS, Washington State University

One refereed publication in 2007

In addition to center funds, Dr. Andrews's research is supported by Seabuck Equine, LLC, and another confidential business.

Effects of Volatile Fatty Acids, Lactic Acid, and Calcium on Stomach Ulcers in the Horse

According to the latest USDA survey, Tennessee ranks second in the U.S. in equine ownership, a total value of approximately \$565 million. Gastric ulcers in horses result in abdominal pain, weight loss, and poor performance, causing economic loss to the industry, particularly in race horses.

The non-glandular squamous region, covering a third of a horse's stomach, contains tender tissue with minimal protection against acid injury. Thus, ulcers in this region of the stomach appear to be more susceptible to volatile fatty acids and lactic acid.

The focus of Dr. Andrews' research is two-fold. First, he seeks to determine the

combined effect of volatile fatty acids and lactic acid together with hydrogen chloride. Then, he plans to investigate calcium as a protective agent.

These two research aims may help clarify, first, why some horses are resistant to treatment with medication, and second, how diet contributes to ulcers in horses. With this information, Dr. Andrews' investigative team hopes to work with feed companies and nutritionists to formulate diets and supplements that produce lower acid concentrations in the stomach.

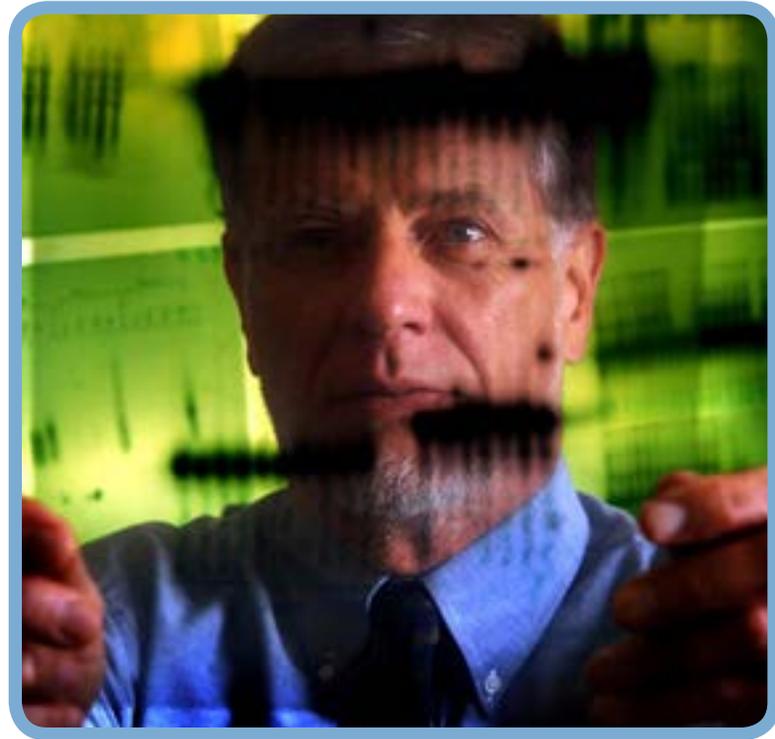
David Brian

Professor
Pathobiology Department

DVM, PhD, Michigan State University

Two refereed publications in 2007

In addition to center funds, Dr. Brian's research is supported by the National Institutes of Health.



Therapeutic Approaches to Coronaviruses

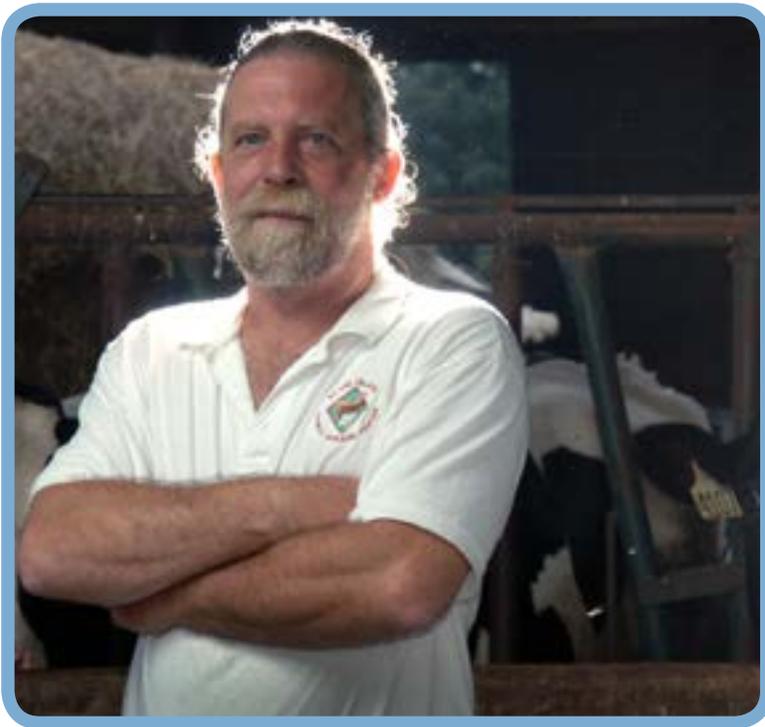
Bovine coronavirus (BCV) has a high incidence rate among cattle, especially dairy cows, in which it can cause decreased milk production and weight loss. In adult cows, the disease is marked by intestinal problems, while calves usually experience respiratory disease.

Dr. Brian's research team is examining the elements required for the replication of BCV. The replication method for any given virus family is unique; therefore, specifying the replication pattern provides potential for designing inhibitory drugs.

This past year, Dr. Brian has determined that the 2'-O-methyl transferase protein in BCV binds to a specific replication element.

His research on this protein and its contribution to BCV replication will be the focus of continuing studies.

The viral group to which BCV belongs also includes the human-type severe acute respiratory syndrome (SARS). Therefore, research on BCV could also lead to breakthroughs in SARS treatment.



Robert L. Donnell

Assistant Professor
Pathobiology Department

DVM, PhD, University of Tennessee

Six refereed publications in 2007

Characterizing the Prevalence of Malignant Catarrhal Fever in Tennessee

A viral infection affecting wildlife in Tennessee may be more widespread than first thought. This virus, malignant catarrhal fever (MCF), poses a potential endemic threat to the animal agriculture industry and affects four known species: cattle, sheep, goats, and deer.

The little-understood MCF virus is characterized by fever and high mortality rates. Transmission is thought to occur via inhalation or ingestion of infectious secretions.

Because no vaccine exists for the disease, segregation of disease hosts from the herd is currently the only method of control. But a lack of coherent surveillance prevents

proper control measures.

Dr. Donnell seeks to determine the distribution and prevalence of MCF throughout the state. His research team spent the last year collecting samples and educating producers, managers, and policymakers within Tennessee about the disease risks.

Nicholas Frank

Associate Professor
Large Animal Clinical Sciences Department

DVM, PhD, Purdue University

Eight refereed publications in 2007

In addition to center funds, Dr. Frank's research is supported by the American Quarter Horse Association, Waltham Foundation, Lloyd Inc., Grayson Jockey Club Research Foundation, the American College of Veterinary Internal Medicine, and SmartPak Equine.



Examining the Relationship Between Laminitis, Insulin Resistance, and Obesity in Horses

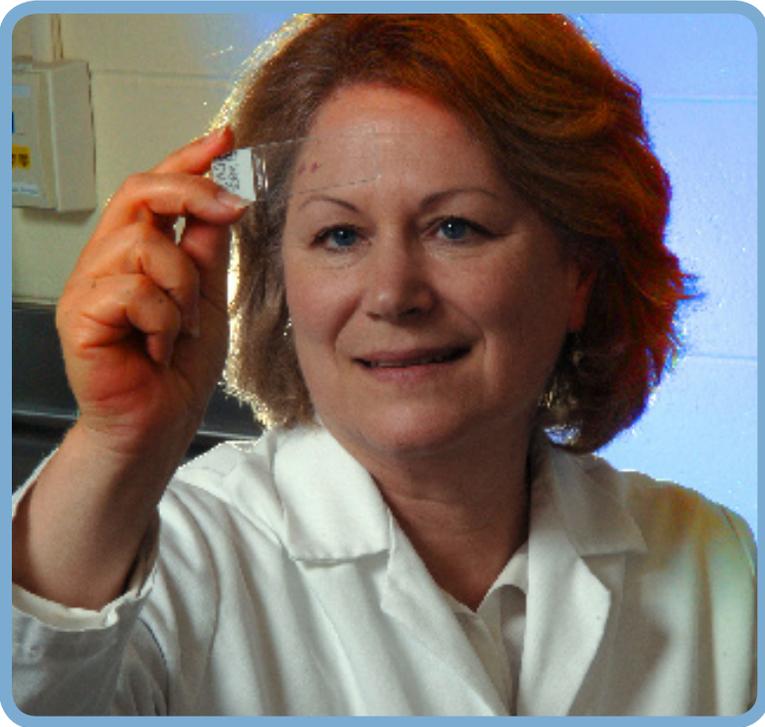
Laminitis, a condition that causes the hoof to separate from the bone, can result in permanent lameness, forced retirement, or euthanasia of horses. The latest USDA report on laminitis frequency indicates that 13% of U.S. horse owners reported at least one of their horses had developed laminitis in 1998.

Although it is known that chronic insulin resistance and obesity are associated with laminitis, the reason for that association is unknown. Dr. Frank's research focuses on the link between the three. His hypothesis is that obese or insulin resistant horses have impaired responses to dietary or systemic challenges to their bodies. These impaired

responses, he believes, make the horse more susceptible to laminitis.

During the past year, Dr. Frank's research team examined blood markers of glucose and lipid metabolism to determine whether they are altered during the development of laminitis. In previous years, Dr. Frank's Center of Excellence funds allowed for the development of tests to quantify glucose-related protein expression in horse tissues, methods essential to ongoing studies.

His research could have a huge economic impact on the Tennessee horse industry, which was worth about \$565 million in 2004.



Claudia Kirk

Associate Professor
Small Animal Clinical Sciences Department

DVM, PhD, University of California, Davis
Eight refereed publications in 2007

In addition to center funds, Dr. Kirk's research is supported by Waltham Foundation, Hill's Pet Nutrition, Morris Animal Foundation, Nestle Purina, Merck-Merial, and another confidential business.

Developing a Screening Method for Canine Amyloidosis

When abnormal proteins deposit within the body, a condition called amyloidosis occurs. Amyloidosis is responsible for multiple myeloma (a form of cancer), Alzheimer's disease, and type II diabetes in humans.

In Chinese Shar-Pei dogs, a hereditary form of amyloidosis, Shar-Pei Fever, can cause renal failure via protein deposits in the kidneys.

Although some methods exist to screen for amyloidosis in humans, veterinary medicine does not have an adequate screening test for renal amyloidosis. Currently, the only way to diagnose the disease is to wait on the clinical signs, but by then, the disease is in its late and irreversible stages.

Dr. Kirk's goal in this study is to develop a PET/CT screening method to allow for early detection of the disease. This test would enhance the ability of breeders to identify affected animals and thus facilitate breeding away from this trait.

In addition, validating a canine model may have far reaching implications for the treatment of other amyloid-associated disorders in humans.

Stephen Oliver

Professor
Animal Science Department

PhD, The Ohio State University

Nine refereed publications in 2007

In addition to center funds, Dr. Oliver's research is supported by Pfizer Animal Health, Fort Dodge Animal Health Global Research, Epitopix LLC, USDA, Pharmacia & Upjohn, and another confidential business.



Inhibiting Mastitis by Targeting Epitopes of SUAM

Mastitis is an inflammatory condition in cows that can last for months or even years, negatively affecting milk production by causing abnormal milk or lowering production quantity. A specific type of mastitis—*Streptococcus uberis* mastitis—has been the focus of Dr. Oliver's research for the last 10 years.

His research resulted in the discovery of a novel bacterial protein, the *Strep. uberis* Adhesion Molecule (SUAM), which is a factor in the development of *Strep. uberis* mastitis. Collectively, experiments from his laboratory have proven that SUAM facilitates the adhesion of *Strep. uberis* to mammary cells.

This year, Dr. Oliver focused on defining

specific parts (epitopes) of SUAM that may be used as targets of antibodies that might inhibit adherence of *Strep. uberis* to the mammary cells. He expects these studies to lead to additional funding to produce synthetic antibodies that can be used to protect cows from mastitis.

His research could positively affect Tennessee's dairy industry by giving dairy owners treatment options and ensuring continued high quality of Tennessee's milk.



Gina M. Pighetti

Associate Professor
Animal Science Department

PhD, Pennsylvania State University

One refereed publication in 2007

In addition to center funds, Dr. Pighetti's research is supported by a confidential entity.

A Telling DNA Marker to Predict Mastitis Susceptibility

Dr. Pighetti, like Dr. Oliver (p. 31), is studying ways to remedy mastitis and its effects on the dairy industry.

Mastitis results when an invading organism penetrates the cow's body. In an attempt to rid itself of the invader, the body sends a type of white blood cell (a neutrophil) to the site of the infection to ingest the invading organism and kill it.

A key component of this process is a small protein, interleukin-8 (IL-8), which induces neutrophil migration, enhances its killing ability, and regulates its survival. This IL-8 protein induces these responses by binding to what are called IL-8 receptors.

Previous COE funding helped Dr. Pighetti's research team to discover a DNA marker in one of these IL-8 receptors that identifies cattle more susceptible to mastitis. This progress is significant in understanding one of the basic mechanisms that contributes to genetic variation in susceptibility to inflammatory-based infectious diseases.

Using this information, novel preventive or therapeutic agents could be developed to modify neutrophil functions and subsequently enhance disease resistance and reduce disease severity. Food safety would be enhanced by improving overall milk quality and reducing the use of antimicrobials.

Barry Rouse

Distinguished Professor
Pathobiology Department

BVSc, University of Bristol, England

PhD, University of Guelph, Canada

DSc, University of Bristol, England

Five refereed publications in 2007

In addition to center funds, Dr. Rouse's research is supported by the National Institutes of Health.



Defining the Influence of NK Cells on Herpes Simplex Virus Type I

Natural killer (NK) cells have been shown to fight against many infections, thereby partially determining an infection's outcome and influencing subsequent immune response to that infection.

However, with the type I herpes simplex virus (HSV), the virus that causes cold sores and eye infections, it is still unclear whether NK cells affect the subsequent immune response. Dr. Rouse's research team believes that with HSV, different subsets of infection-fighting cells become activated, such as memory T cells, which recognize a previously-encountered infection and initiate a stronger defense.

Therefore, during the past year, Dr. Rouse has worked to define the influence of the NK cell response and its manipulation on other cell responses to HSV. Once this influence is determined, it will aid in optimizing effective HSV vaccines.

Dr. Rouse hypothesizes that the interaction of HSV and its current vaccine formulations with the NK cell system affects other infection-fighting cell responses.



T.W. Schultz

Professor
Comparative Medicine Department

PhD, University of Tennessee
Eight refereed publications in 2007

In addition to center funds, Dr. Schultz's research is supported by the Department of Defense, the Environmental Protection Agency, and the International QSAR Foundation.

Classifying Xenobiotics Based on Their Biological Activity

Xenobiotics are foreign substances within the body that adversely affect human health via direct contact, such as with toxins in sewage or certain pesticides. This contact can result in acute, irreversible effects.

One of the major challenges facing toxicologists like Dr. Schultz is determining how chemical structure influences biological activity. In other words, does the body change a chemical's structure, and does this change affect the reactivity of that chemical with the body?

To better predict the body's reaction to chemicals, Dr. Schultz has been developing tests to identify molecular initiating events. His research involves grouping toxi-

cants not by conventional chemical class, but rather by how they interact and react with proteins found in the body.

Eventually, all this information will be compiled in a toxicity database and made available to experts in the field. One way this database will eventually be used is to provide accurate information for those in the chemical industry to assist them in assessing the potential harmfulness of their products.

Karen M. Tobias

Professor
Small Animal Clinical Sciences Department

DVM, University of Illinois
MS, The Ohio State University

Four refereed publications in 2007

In addition to center funds, Dr. Tobias's research is supported by DeRoyal Industries and the American Kennel Club Canine Health Foundation.



Using an Ameroid Constrictor to Control Liver Shunts

A liver shunt is a blood vessel that diverts blood around the liver instead of through it, causing a release of toxins normally filtered by the liver. This condition is most often seen in small breed dogs, but can also occur in cats.

Scintigraphy, a nuclear video scan that measures blood flow, is usually used to initially diagnose shunts. To correct the problem, an ameroid constrictor is often placed in the shunt to close it. The ameroid constrictors used now are made of an inner-ring of casein, a protein found in milk, that slowly swells as it absorbs body fluid. That casein ring is surrounded by a stainless steel sheath so the

casein will swell inwardly, eventually closing the constrictor and consequently cutting off (occluding) blood flow through the shunt. Dr. Tobias's research group is working to develop a new type of occlusion procedure and has studied cellophane banding of the shunt, as well as inserting coils to close it.

Ameroid constrictors are also being used in medical research applicable to humans. These constrictors have proven useful during angiogenesis, a process involving the growth of new blood vessels, and may provide relief for angina.

Frank M. Andrews (p. 26)

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Andrews, Frank	Validation of the use of a capsule for measurement of transit time, pH, temperature and luminal pressure in the gastrointestinal tract of horses	Confidential	01/01/07-12/31/07	\$46,015	\$9,119
	The efficacy of Seabuckthorn Liquid Supplement in prevention of gastric ulcers in horses	Seabuck Equine LLC	02/01/07-01/31/08	\$10,725	\$7,888
Baek, Seung Joon	PPAR-gamma ligands in colorectal cancer	National Institutes of Health	07/01/06-06/30/11	\$1,029,500	\$204,406
	Gene alteration by NSAIDS	American Cancer Society	07/01/06-06/30/09	\$522,000	\$131,153
	Anti-cancer effects by the green tea catechins	National Institutes of Health	04/06/05-03/31/08	\$337,331	\$182,460
Brian, David	Mechanisms of coronavirus RNA amplification	National Institutes of Health	06/15/02-05/31/07	\$1,735,219	\$366,973
Cui, Mei-Zhen	Lysophosphatidic acid and tissue factor in atherosclerosis	National Institutes of Health	07/01/04-04/30/08	\$1,002,400	\$242,699
	Role of lysophosphatidic acid and other lipid peroxidation products in smoking-induced atherothrombosis	Philip Morris	07/01/04-06/30/07	\$547,397	\$187,235
Frank, Nicholas	Evaluating the effects of endotoxin on glucose dynamics in horses using intravenous glucose tolerance tests and euglycemic hyperinsulinemic clamp techniques	American Quarter Horse Association	10/01/05-09/30/06	\$36,331	\$4,676

Investigator	Project Title	Funding Agency	Project Period	Total Award	2007 Expenditures
Frank, Nicholas	Development of an optimal protocol for evaluating insulin secretion and insulin sensitivity in horses	Waltham Foundation	07/01/06-06/30/07	\$15,000	\$14,981
	Levothyroxine as a treatment for equine metabolic syndrome	Lloyd, Incorporated	04/01/07-03/30/09	\$58,876	\$3,561
	Levothyroxine as a treatment for equine metabolic syndrome	Grayson Jockey Club Research Foundation	04/01/07-03/30/09	\$58,876	\$810
	Improved diagnosis and monitoring of equine endocrine disorders	American College of Veterinary Internal Medicine	01/01/07-12/31/07	\$15,000	\$0*
	Effects of SmartControl IR on insulin sensitivity in obese insulin-resistant horses	SmartPak Equine	06/01/07-05/31/10	\$77,945	\$0*
Kania, Stephen	Molecular pathways that mediate genetic susceptibility to low dose ionizing radiation	UT-Battelle-Oak Ridge National Laboratory	02/15/07-02/14/08	\$22,206	\$8,519
	RNA interference of the glycoprotein-D and DNA polymerase genes of feline herpesvirus by synthetic siRNAs	Winn Feline Foundation	01/01/06-12/31/07	\$10,863	\$9,276
	Evaluation of neutrophil function in treated tumor-bearing dogs	American Kennel Club Canine Health Foundation	10/01/06-09/30/07	\$12,906	\$4,558
Kirk, Claudia	To evaluate the efficacy, including photographs, and safety of a drug administered once daily to obese dogs presented as veterinary patients	Confidential	07/18/05-07/17/08	\$30,375	\$2,169
	Antioxidant status and oxidative stress in dogs with diabetes mellitus	Waltham Foundation	07/01/06-12/30/07	\$14,952	\$7,215

Investigator	Project Title	Funding Agency	Project Period	Total Award	2007 Expenditures
Kirk, Claudia	Urinary markers of feline idiopathic cystitis (FIC) multi-center trial	Hill's Pet Nutrition	09/30/05-05/08/07	\$93,841	\$4,419
	Activity product ratios and calcium oxalate urolith risk in cats with chronic renal disease	Morris Animal Foundation	01/01/07-12/31/07	\$27,099	\$0 ^s
	Characterize the hormone adiponectin in felids by determining cDNA sequence, mRNA expression, and molecular weight composition	Nestle Purina	01/01/07-12/31/07	\$5,938	\$3,027
	2006 Merck-Merial veterinary scholars research grant	Merck-Merial	02/28/06-02/27/07	\$10,000	\$4,769
Oliver, Stephen	Efficacy and safety of CP-40,624 for intramammary treatment of subclinical mastitis in lactating dairy cows	Pfizer Animal Health	09/30/05-09/08/06	\$13,503	\$747
	Dosing and duration of an intramammary treatment of experimentally-induced <i>Streptococcus uberis</i> mastitis in lactating dairy cattle	Pfizer Animal Health	08/14/06-08/14/07	\$232,619	\$132,307
	Efficacy of a drug for lactating dairy cows with severe clinical mastitis	Pfizer Animal Health	10/16/06-12/31/07	\$35,480	\$0*
	Animal health innovation award	Fort Dodge Animal Health Global Research	12/25/05-01/31/07	\$234,646	\$145,055
	Development of a chronic E. Coli experimental intramammary infection model	Epitopix, LLC	04/15/07-03/31/08	\$69,010	\$0*

Investigator	Project Title	Funding Agency	Project Period	Total Award	2007 Expenditures
Oliver, Stephen	Evaluation of safety and protection of dairy cows experimentally infected with <i>E. coli</i> following administration of an <i>E. coli</i> vaccine during the nonlactating period	Epitopix, LLC	02/07/06-12/31/06	\$86,468	\$76,260
	Role of <i>Streptococcus uberis</i> adhesion molecule (SUAM) in the pathogenesis of bovine mastitis	United States Department of Agriculture	06/01/04-07/31/07	\$340,000	\$71,939
	Mastitis pathogen adherence and internalization	Confidential	12/05/05-12/31/06	\$36,000	\$29,938
	Molecular genetics of <i>Streptococcus uberis</i> as it relates to its ability to cause mastitis in dairy cows	Pharmacia & Upjohn	08/01/00-09/02/06	\$150,000	\$29,235
Pighetti, Gina	Developing a multi-site haplotype marker for mastitis susceptibility in Holstein cattle	Confidential	03/31/05-08/31/06	\$30,000	\$11,495
Plummer, Howard	GIRK channels, beta-adrenergic signaling, and breast cancer	Philip Morris	07/01/04-06/30/07	\$752,989	\$216,332
Rouse, Barry	T Regulatory Cells in herpes simplex virus immunity and immunopathology	National Institutes of Health	02/01/06-01/31/11	\$1,793,269	\$299,368
	Mechanisms in herpetic keratitis	National Institutes of Health	09/30/02-09/29/07	\$1,779,700	\$325,894
Schuller, Hildegard	Transplacental pancreatic carcinogenesis by NNK	National Institutes of Health	05/01/03-04/30/08	\$1,158,400	\$132,040 ^s

Investigator	Project Title	Funding Agency	Project Period	Total Award	2007 Expenditures
Schuller, Hildegard	Preclinical model for chemoprevention of non-small cell lung cancer in former smokers	National Institutes of Health	05/01/03-04/30/07	\$868,800	\$67,011
	NNK, beta-adrenergic AA release, and lung cancer	National Institutes of Health	04/01/02-03/31/07	\$1,142,201	\$2,555 ^s
	New radiotracers for targeting mutated protein for the early detection of lung cancer	Department of Energy	05/15/04-08/14/07	\$181,135	\$4,020
Schultz, T.W.	Biosurveillance, agriculture, and environmental security: A coordinated, innovative approach	Department of Defense	12/01/04-11/30/06	\$1,977,131	\$203,772
	Bioluminescent yeast-reporter system for screening chemicals for estrogenic and androgenic effects	Environmental Protection Agency	10/01/03-09/30/07	\$11,499	\$3,971
	Non-enzymatic reactivity of selected sensitizers and respiratory toxicants	International QSAR Foundation (gift)	7/1/2006	\$10,000	\$0
Tobias, Karen	Hemostatic Dressing	DeRoyal Industries, Inc.	02/12/07-03/11/07	\$7,105	\$5,137
	The effect of physiologic dexamethasone on blood glucose level in dogs following congenital portosystemic shunt ligation	American Kennel Club Canine Health Foundation	10/01/06-09/30/07	\$12,960	\$2,235

Investigator	Project Title	Funding Agency	Project Period	Total Award	2007 Expenditures
Wang, Hwa-Chain Robert	Potency and molecular signatures of tobacco carcinogens in the early development of human breast cancer	Philip Morris	07/01/03-03/31/07	\$633,326	\$124,950
	Signaling pathway in modulation of cell quiescence	National Science Foundation	06/01/05-05/31/07	\$100,000	\$16,145
	Global initiatives in veterinary education	Association of American Veterinary Medical Colleges (gift)	12/1/2006	\$27,000	\$0
Xu, Xuemin	Role of a novel protein (PSAP) in neurodegeneration	National Institutes of Health	09/01/01-08/31/06	\$1,282,500	\$2,432 [§]
	The role of the new zeta cleavage in ABeta formation	National Institutes of Health	04/01/07-03/31/12	\$1,486,250	\$55,233
	Determine the role of the long Abeta-46 in AD development	Alzheimer's Association	10/01/05-09/30/08	\$240,000	\$72,074

* New account

§ No-cost extension

**CENTERS OF EXCELLENCE/CENTERS OF EMPHASIS
ACTUAL, PROPOSED, AND REQUESTED BUDGET**

Institution: College of Veterinary Medicine

Center: Livestock Diseases & Human Health

	FY 2006-07 Actual			FY 2007-08 Proposed			FY 2008-09 Requested		
	Matching	Appropri.	Total	Matching	Appropri.	Total	Matching	Appropri.	Total
Expenditures			0			0			0
Salaries									
Faculty	25,903	51,805	77,708	26,530	53,060	79,590	27,857	55,713	83,570
Other Professional	60,456	120,911	181,367	63,082	126,164	189,246	66,236	132,472	198,708
Clerical/ Supporting	22,370	44,741	67,111	22,699	45,398	68,097	23,834	47,668	71,502
Assistantships	31,271	62,541	93,812	37,422	74,844	112,266	39,293	78,586	117,879
Total Salaries	139,999	279,999	419,998	149,733	299,466	449,199	157,220	314,439	471,659
Longevity	895	1,790	2,685	1,060	2,120	3,180	1,113	2,226	3,339
Fringe Benefits	32,860	65,720	98,580	35,379	70,759	106,138	37,148	74,297	111,445
Total Personnel	173,754	347,509	521,263	186,172	372,345	558,517	195,481	390,962	586,443
Non-Personnel									
Travel	5,955	11,909	17,864	6,500	13,000	19,500	6,825	13,650	20,475
Software	240	480	720	858	1,717	2,575	901	1,803	2,704
Books & Journals	217	433	650	183	367	550	193	385	578
Other Supplies	44,345	88,647	132,992	45,766	91,531	137,297	33,798	67,595	101,393
Equipment	23,933	47,866	71,799	17,284	34,609	51,893	18,163	36,325	54,488
Maintenance	12,966	25,931	38,897	13,333	26,667	40,000	8,750	17,500	26,250
Scholarships	11,941	23,883	35,824	12,000	24,000	36,000	7,532	15,064	22,596
Consultants	0	0	0	0	0		0	0	0
Renovation	0	0	0	0	0		0	0	0
Rentals	44	88	132	67	133	200	70	140	210
Media / Communication	544	1,087	1,631	667	1,333	2,000	700	1,400	2,100
Group Arranged Food & Lodging / Specialized Commercial Services / Seminar Conference Registration	3,528	7,057	10,585	6,000	12,000	18,000	6,300	12,600	18,900
Other Services & Expenditures	9,804	19,608	29,412	12,860	25,720	38,580	13,503	27,006	40,509
Total Non-Personnel	113,516	226,990	340,506	115,518	231,077	346,595	96,734	193,468	290,202
GRAND TOTAL	287,270	574,499	861,769	301,690	603,422	905,112	292,215	584,430	876,645
Revenue									
New State Appropriation		546,300	546,300		556,600	556,600		584,430	584,430
Carryover State Appropriation		75,021	75,021		46,822	46,822			0
New Matching Funds	273,150		273,150	278,300		278,300	292,215		292,215
Carryover from Previous Matching Funds	37,510		37,510	23,390		23,390			0
Total Revenue	310,660	621,321	931,981	301,690	603,422	905,112	292,215	584,430	876,645