THE UNIVERSITY of TENNESSEE

College of Veterinary Medicine

Center of Excellence

in Livestock Diseases and Human Health

Annual Report 2006

Editor
Misty Bailey

Photography
Greg Hirshoren

Design
Anik Vasington

Message from the Center of Excellence

We are pleased to present the 2006 annual report for the Center of Excellence in Livestock Diseases and Human Health. Along with benchmark data for fiscal years 2002-2006, this report includes highlights of faculty research projects funded by the center in 2006.

During 2006, the center supported the research efforts of 20 different faculty who were engaged in research that ultimately will benefit the citizens of Tennessee and the nation, 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 2006. External funding increased from $19,735,365 in 2005 to $20,666,950 in 2006; research expenditures stabilized at $3,923,521 in 2006. The one-year return on the state's investment in the center as the ratio of research expenditures to the state's appropriation is 7.5:1. Center faculty continue to garner national and international recognition for their research and scholarship. During 2006, center faculty published 71 peer-reviewed articles and gave 62 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

Misty Bailey, Michael J. Blackwell, Robert N. Moore

FY 2006 Summary of Accomplishments

Benchmark	Fiscal Year 2006 (20 faculty in center)	Fiscal Year 2005 (18 faculty in center)
Publications		
Refereed Articles	79	92
Books or Book Chapters	7	8
Proceedings	16	27
Abstracts	8	37
Presentations		
National	31	13
International	18	14
State or Local	13	NA
Research Monies		
External Funding	$20,666,950	$19,735,365
Research Expenditures	$3,923,521	$4,062,244
Return on Investment	7.5:1	7.8:1

Table of Contents

Program Report

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 College of Agricultural Sciences and Natural Resources.

Research Funding

The center awarded $462,033 in seed money and start-up funds in 2006. For three graduate student stipends, the center contributed $38,624.

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.

The Research and Graduate Programs Advisory Committee reviews funding requests based on three main criteria: scientific merit, potential to lead to extramural funding, and relevance to the center's objectives.

Center faculty consist of senior members who have research interests in line with center objectives and have 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 four faculty to secure additional external funding. Drs. Margo Holland, Tomas Martin-Jimenez, Mario Prado, and Jeffrey Phillips were awarded a total of $184,802.

Dr. Holland's research involves bovine mammary gland recapitulation, using stem cells. Dr. Martin-Jimenez is interested in drug dose adjustment in special animal populations or those under special therapeutic conditions. 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.

Accomplishments

- External funding totaled $20,666,950
- New grants totaled $2,703,177
- Return on investment 7.5:1

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. Center accomplishments for the year 2005-2006 were excellent in terms of benchmarks and extramural funding base.

The 20 center faculty averaged approximately 4 refereed publications (79 total), and 2 invited presentations (49 total) at prestigious national and international meetings. See Publications and Presentations for details.

The return on the state's investment in the center was 7.5:1, calculated as ratio of expenditures from extramural funding to center appropriation. Extramural funding totaled $20,666,950, an increase of $931,585 this year. The total funding includes new multi-year awards for Drs. Frank, Oliver, Pighetti, Rouse, Small, Tobias, and Xu, totaling $2,703,177. Research expenditures stabilized at $3,923,521. See Research Expenditures and Research Funded Externally for the fiscal year 2006 data summary.

Dissemination of Research

The CVM distributes two publications to the public: the quarterly newsletter *Volunteer Vet* and the annual magazine *Veterinary Vision*. These publications, which carry features concerning ongoing research activities and the results of concluded research studies, are written for a general audience. In addition, a new, in-house quarterly newsletter, *Discovery*, keeps CVM researchers informed about each other's work and research-related policies and resources. The CVM Web site provides an overview of the types of research conducted by the CVM and COE faculty. The CVM also 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. In addition, faculty are encouraged to share their research by speaking to professional groups, community groups, and civic groups.

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 2006, the committee authorized $13,980 toward the purchase of three pieces of equipment. These equipment grants benefited several investigators, including Dr. Mei-Zhen Cui, Dr. Xuemin Xu, and all investigators who use the tissue culture core laboratory facility.

In support of the CVM's research enterprise, the center funded service contracts for two pieces of equipment purchased previously with COE funds. These contracts totaled $31,642.

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.

Center of Excellence/Merck-Merial Summer Student Research Program

In an effort to foster interest in careers in biomedical research, the center helped provide opportunities for 19 veterinary students to perform research within the College of Veterinary Medicine during the summer.

In addition to laboratory and field research, students attend weekly 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. Three of those abstracts were presented as posters at the 2006 Merck/Merial Veterinary Scholar Symposium.

Dr. Claudia Kirk, coordinator of the summer research program, received a $10,000 grant from Merck-Merial to help fund the program.

To maximize student participation, the program is open to both center and non-center faculty. During fiscal year 2006, five COE faculty participated in the program. The center will continue to encourage participation of center faculty.

Dr. Claudia Kirk, coordinator of the summer research program, continues to receive external funding to enhance this program. Merck-Merial provided a $10,000 grant to help fund the program.

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 second-year student from Knoxville, studied the causes of gastric ulcer diseases in horses. She used an Ussing's 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.

Megan Anderson is a second-year student from Nashville. She earned a B.S. degree in zoology from Mars Hill College. This summer, Megan assisted Dr. Daryl Millis and his staff in developing a canine fitness test in hopes of creating an appropriate exercise program for dogs in training. This project involved 3-D motion analysis to determine if fatigue affects gait or plays a role in musculoskeletal injury.

Catherine C. Ashe earned a B.A. degree in biology from Maryville College. Originally from Greeneville, she also studied biology at Florida Southern College. This summer, Catherine assisted Dr. Cheryl Greenacre in drawing blood samples from Amazon parrots. A student in her third year, Catherine learned to run a flow cytometric assay, a method being tested for segregating the heterophil population of leukocytes from other white blood cells. She is interested in staying in academic research and plans to pursue an internship and residency post graduation.

Sandi Bates, a third-year student from Nashville, worked to help Dr. Robert Donnell determine whether the amount of time a tissue is fixed in formalin affects DNA degradation. In the laboratory, Sandi fixed lymph nodes in various fixatives, performed DNA extractions, ran gel electrophoresis, and did spectrophotometry. She majored in animal science at the University of Tennessee and is interested in clinical medicine.

Julie E. Bishop, a second-year student from Nashville, earned a B.S. degree in biology from Rhodes College. Under the direction of Dr. Joe Bartges, she performed ion chromatography and gathered pH and ammonia data for a study focused on preventing calcium oxalate stones in cats. Julie hopes to pursue an academic research career and plans to submit a publication that details the research findings from this project.

A graduate of UCLA with a B.S. in computer science, **Thomas Chen** worked with Dr. Alfred Legendre to map cases of blastomycosis, a fungal disease in humans and dogs. A second-year student from San Francisco, CA, Thomas mapped cases in Knox County to try to correlate these cases to geographic features such as soil pH, organic matter content, and proximity to water. The ecological reservoir of the disease's causative agent has been unknown.

Originally from Brentwood, **Andrew Fidler** attended Cornell University, where he earned a B.S. degree with a major in animal science. Andrew, a third-year student, worked with Dr. Thomas Doherty to study the effect of lidocaine and ketamine on the anesthetic ability of sevoflurane in dogs. His responsibilities included assisting in the induction of anesthesia, instrumentation, and monitoring. Andrew's interests lie with rural, small and large animal medicine and international sustainable agriculture.

Sandra Fleming, a second-year student from Cleveland, attended Auburn University, where she took a B.S. in animal science. Sandra assisted Dr. Mario Prado in identifying and sequencing of *Streptococcus uberis* and related bacteria molecules, which help bacteria adhere to and enter host mammary cells in cattle. She learned to perform polymerase chain reactions, cloning, sequencing, and Western blotting as part of a study to prevent mastitis in cattle.

Irene Lavigne is a third-year student from Woodville, OH. She earned a B.S. in biology with a minor in chemistry from the University of Findlay. Under the direction of Dr. Sarel Van Amstel, Irene collected fecal and blood samples from llamas to help validate the FAMACHA system for control of gastrointestinal nematodes in camelids. As part of this parasitic control regime, Irene also performed fecal egg counts, ran sugar floats, and presented her project at two meetings. She is interested in working in equine and food animal medicine.

A third-year student from Knoxville, **Charles E. Lewis** earned a B.S. in animal science from the University of Tennessee. This summer, under the direction of Dr. Karen Tobias, Charles worked mainly on a retrospective project concerning post-surgical management of rectal perforations in dogs and cats. He presented his research as a poster at the 2006 Merck/Merial Veterinary Scholars Program Symposium at Louisiana State University. Charles hopes to pursue a research career in a university setting.

Jody Markwardt, a third-year student from Lubbock, TX, earned a B.S. in biology from Lubbock Christian University and an M.S. in biotechnology from Texas Tech University. Jody worked with Dr. Melissa Kennedy to determine whether specific tests could be used to detect feline infectious peritonitis in cheetahs. She ran real-time polymerase chain reaction experiments and did Western blot analyses on cheetah serum in preparation for her career in laboratory animal medicine.

Originally from Dayton, **Abigail Martin** earned a B.S. in animal science with a minor in chemistry from Middle Tennessee State University. This third-year student worked with Dr. Jerry Roberson to screen dairy herds for mycoplasma bacteria. She helped collect and culture bulk-tank milk samples for real-time polymerase chain reaction tests to determine whether the bacteria are responsible for the herds' high somatic cell counts, which can cause mastitis, a painful condition that can damage milk-producing tissue. Abigail hopes to pursue rural, dairy veterinary medicine.

A third-year student from Tavares, FL, **Allison L. Milligan** earned a B.A. in biology from Maryville College, where she also minored in chemistry. Under the direction of Dr. Jennifer Stokes, Allison worked to help discover more prognostic indicators for cats with inflammatory bowel disease. She has a strong interest in zoological medicine.

Originally from Medina, NY, second-year student **Karie Myers** earned a B.A. from Wells College, where she majored in biological and chemical sciences. While most other students spent most of their time in the laboratory, Karie spent much of her time in the Great Smoky Mountains National Park collecting fecal samples from passerine birds. Under the direction of Dr. Charles Faulkner, Karie examined the samples for parasites to identify trends in infestation and investigate the reasons behind them. She is interested in exotics, small ruminants, and camelids.

Kelly A. Perdue, a second-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.

A third-year student from Cleveland, **Helen Reaves** majored in animal science at the University of Tennessee. Along with faculty mentor Dr. Madhu Dhar, Helen analyzed the gene expression of mouse models being used to study type 2 diabetes. The purpose of the project was to learn more about the insulin signaling pathway to eventually provide a new therapy for the disease. Helen learned to perform RNA extraction and purification and worked extensively with real-time polymerase chain reactions. Helen hopes to become a certified animal behaviorist.

Erica Stieve-Caldwell, a third-year student from Aiken, SC, studied ecology, evolution, and population biology at Purdue University. Her B.S. degree also included a minor in anthropology. Erica earned an M.A. in marine ecology from Boston University, and for the past two summers, she has been involved in describing the seroprevalence of two parasites in Alaskan wildlife. While working with Dr. Sharon Patton, Erica determined that one of these parasites, Neospora, is likely to play a role in the reproductive health of caribou. She hopes to pursue a career in research of wildlife disease and conservation medicine.

After studying graphic arts at Appalachian State University, **Kristi D. Sowers** turned to animal science at North Carolina Agricultural and Technical University. A native of Winston-Salem, NC, this second-year student worked with Dr. Linda Frank to determine what role estrogen receptors play in the canine hair cycle. Kristi reviewed and interpreted alpha-estrogen receptor slides, as well as studied correlations between the dogs' medical records. She wants to pursue wildlife or zoo medicine upon graduation.

Sharon Lee Stone, a third-year student from Memphis, attended the University of Memphis, where she earned a B.S. degree in biology. Sharon's summer research with faculty director Dr. Edward Ramsey at Tiger Haven in Kingston coincides with her professional aspirations: to do conservation and animal welfare research. She assisted in videotaping large cats given pain relievers for chronic pain or lameness so that viewers could later assess and score the cats' gait and lameness. The scores will help determine which drug has the optimal effect.

Five-Year Benchmark Data

Productivity among center faculty has been outstanding during the last five-year period. From 2002-2006, center faculty published 450 articles in peer-reviewed journals and gave 235 invited presentations at national and international meetings. In addition, total external funding increased from approximately $11.4 million in 2002 to $20.6 million in 2006. Funding from federal sources increased from approximately $9.9 million in 2002 to $17 million in 2006. Furthermore, research expenditures increased from $2.4 million in 2002 to $3.9 million in 2006. The five-year average return on the state's investment in the center is 6.6:1, the ratio of research expenditures to the state's appropriation. For comparison, benchmark data from 2002-2006 are summarized in the tables and charts that follow.

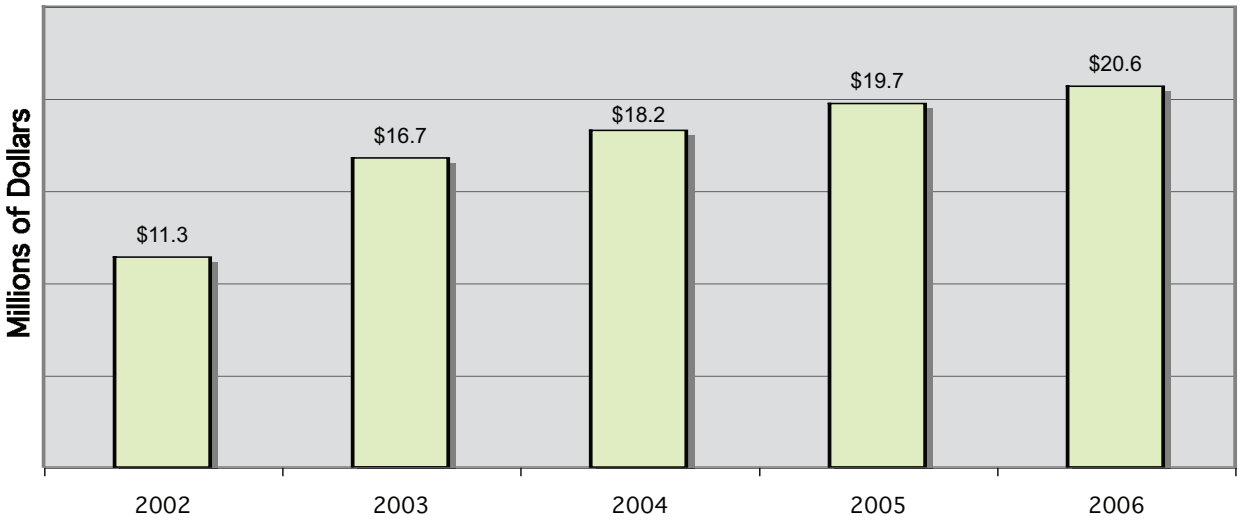
Benchmark Summary 2002-2006

Average refereed articles per faculty member = **5**
External funding increased **81.4%**
Federal funding increased **39.9%**
Expenditures increased **60.4%**
Average ROI = **6.6:1**

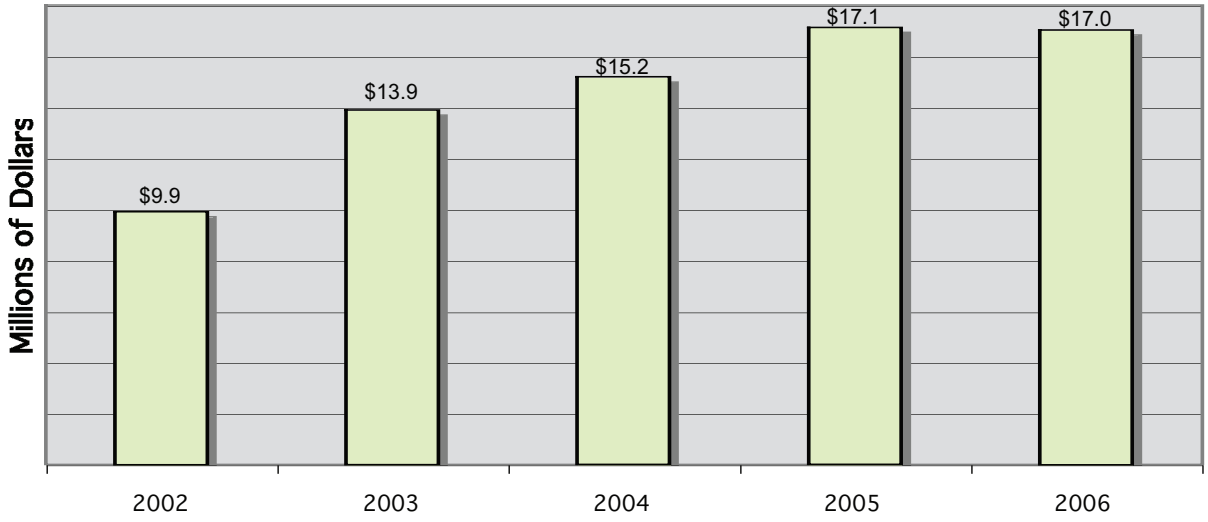
Publications & Presentations 2002-2006

Year	Faculty	Articles	Book and Chapters	Proceedings	Abstracts	National Presentations	International Presentations
2002	14	57	2	16	30	10	33
2003	20	116	11	17	70	24	26
2004	17	106	4	35	60	35	31
2005	18	92	8	27	37	13	14
2006	20	71	7	16	8	31	18
Totals		442	32	111	205	113	122

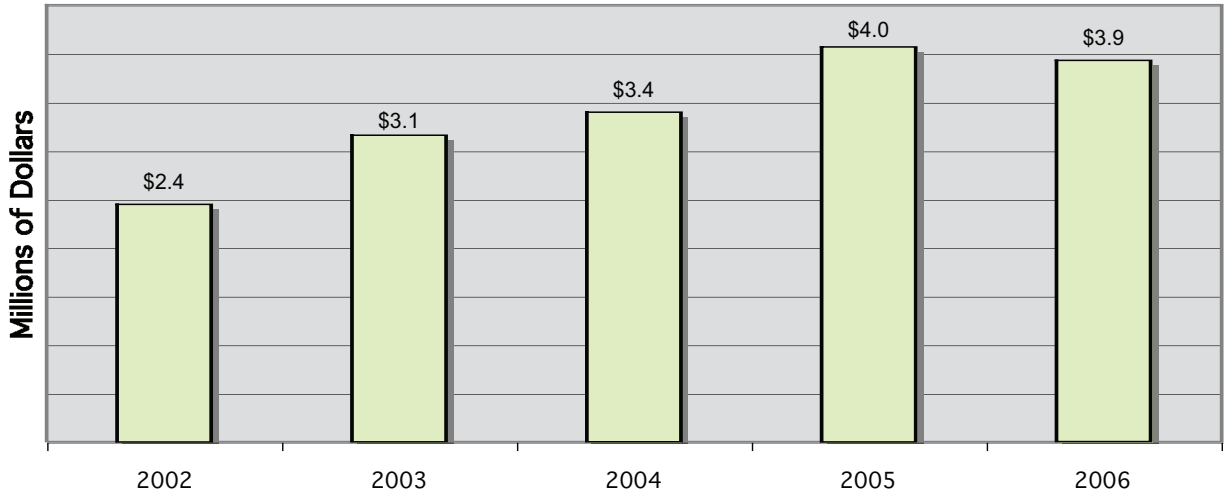
External Funding*



Federal Funding*



Research Expenditures by Fiscal Year



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

Return on Investment as Ratio of Expenditures to State Appropriation by Fiscal Year

Year	Faculty	State Appropriation	Research Expenditures	Return on Investment
2002	14	$508,500	$2,444,578	4.8:1
2003	20	$516,000	$3,156,469	6.1:1
2004	17	$495,600	$3,392,469	6.8:1
2005	18	$514,600	$4,062,712	7.8:1
2006	20	$526,300	$3,923,521	7.5:1
			Average Return on Investment	***6.6:1***

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 (FY07) the center will expend approximately $408,000 to fund 19 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 and has committed nearly $79,000 for purchasing essential research equipment.

In addition, the center will continue to promote and pursue collaborative projects with other units to enhance research that supports its objectives and to contribute significantly to the research enterprise of the College of Veterinary Medicine, the Institute of Agriculture, and the university. Ongoing collaborations will include established efforts with the Tennessee Agriculture Experiment Station, the Food Safety Center of Excellence, the Center for Environmental Biotechnology, and the departments of Nutrition and Mechanical, Aerospace, and Biomedical Engineering. The center will also support a newly developing collaborative interaction with investigators in the Graduate School of Medicine concentrating on advanced imaging technology using positron emission tomography. This PET/CT initiative will have immediate impact on the college's oncology emphasis area and promises to influence clinical research in other areas.

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

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 FY07, the center will sponsor courses and guest speakers in Microbial Pathogenesis and Mechanisms of Disease.

The center will continue to participate conceptually and materially in strategic planning to develop areas of investigative strength in the College of Veterinary Medicine and the Institute of Agriculture.

Research Expenditures FY 2006

Project Director	Federal	Industry	Foundation/Private	Totals
Baek, Seung Joon	$211,877	$0	$0	$211,877
Brian, David	$416,315	$0	$0	$416,315
Cui, Mei-Zhen	$309,799	$210,122	$10,669	$530,590
Dhar, Madhu S.	$0	$0	$57,074	$57,074
Frank, Nicholas	$0	$8,535	$44,794	$53,329
Kania, Stephen	$0	$7,221	$0	$7,221
Oliver, Stephen	$83,180	$123,763	$0	$206,943
Pighetti, Gina M.	$0	$33,784	$0	$33,784
Plummer III, Howard K.	$0	$196,863	$0	$196,863
Rouse, Barry	$594,441	$0	$0	$594,441
Schuller, Hildegard	$700,469	$0	$0	$700,469
Schultz, T.W.	$277,361	$0	$0	$277,361
Small, Pamela	$211,430	$0	$18,024	$229,454
Tithof, Patricia	$2,210	$0	$0	$2,210
Tobias, Karen M.	$0	$0	$10,930	$10,930
Wang, Hwa-Chain Robert	$0	$186,109	$0	$186,109
Xu, Xuemin	$146,225	$0	$62,325	$208,550
Totals	**$2,953,308**	**$766,397**	**$203,816**	**$3,923,521**

Research Funded Externally FY 2006

Project Director	Federal	Industry	Foundation/Private	Totals
Baek, Seung Joon	$661,331	$0	$0	$661,331
Brian, David	$1,735,219	$0	$0	$1,735,219
Cui, Mei-Zhen	$1,002,400	$547,397	$154,000	$1,703,797
Dhar, Madhu S.	$0	$0	$110,000	$110,000
Frank, Nicholas	$0	$20,580	$55,933	$76,513
Kania, Stephen	$0	$50,000	$0	$50,000
Oliver, Stephen	$340,000	$756,219	$99,922	$1,196,141
Pighetti, Gina M.	$0	$84,397	$0	$84,397
Plummer III, Howard K.	$0	$752,989	$0	$752,989
Rouse, Barry	$5,229,219	$0	$0	$5,229,219
Schuller, Hildegard	$3,350,536	$0	$0	$3,350,536
Schultz, T.W.	$1,988,630	$0	$0	$1,988,630
Small, Pamela	$1,414,750	$0	$35,800	$1,450,550
Tithof, Patricia	$8,842	$0	$0	$8,842
Tobias, Karen M.	$0	$0	$12,960	$12,960
Wang, Hwa-Chain Robert	$0	$633,326	$100,000	$733,326
Xu, Xuemin	$1,282,500		$240,000	$1,522,500
Totals	**$17,013,427**	**$2,844,908**	**$808,615**	**$20,666,950**

Faculty Reports

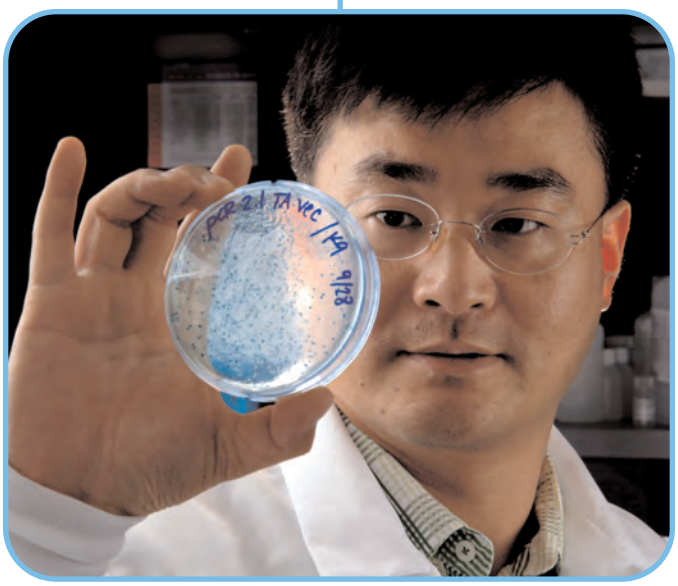
Seung Joon Baek

Ph.D., University of Maryland

Assistant Professor,
Department of Pathobiology

Eight refereed publications in 2006

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



Seung Joon Baek

Molecular Carcinogenesis: NSAIDs, Dietary Compounds, and Tumorigenesis

Colorectal cancer is the second leading cause of death in the United States. It occurs when tumors form in the lining of the large intestine. There are several known cancer chemopreventive compounds, but non-steroidal anti-inflammatory drugs (NSAIDs), including aspirin, ibuprofen, and naproxen, are the most well determined chemopreventive compounds in colorectal cancer. However, how these NSAIDs affect colorectal cancer is largely unknown.

Apoptosis, or programmed cell death, induction by NSAIDs is one known mechanism that exerts anti-tumorigenic activity. Dr. Baek's research group has found that NSAIDs induce several pro-apoptotic proteins that play pivotal roles in NSAID-induced anti-tumorigenesis. Specifically, PPARgamma ligands, chemopreventive compounds induced by NSAIDs, have shown anti-cancer activity. These compounds are already being used in anti-diabetic drugs. PPARgamma ligands work by increasing the expression of tumor suppressor proteins.

Dr. Baek is also researching polyphenols, antioxidant plant materials that are found at our dinner table. Many food components of grapes, soybeans, green tea, cabbage, and broccoli possess anti-cancer activity. Indeed, epidemiological studies have suggested that nutrition plays an important role in carcinogenesis, and dietary factors have been estimated to account for up to 80% of cancers of the gastrointestinal tract. Approximately 30% of cancer morbidity and mortality might be prevented with proper adjustment of diets. Dr. Baek's team has found that several polyphenols increase tumor suppressor proteins at the transcriptional level. His research will provide better rationale in designing cancer chemopreventive compounds in the future.

Mei-Zhen Cui

Ph.D., Tokyo Institute of Technology, Japan

Associate Professor,
Department of Pathobiology

Seven refereed publications in 2006

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

Mei-Zhen Cui

Role of Oxidized Lipoproteins and Lysophosphatidic Acid in the Development of Atherosclerosis

Heart disease is the number one killer in the United States, and atherosclerosis accounts for 75% of those deaths. Atherosclerosis occurs because of the accumulation of fatty deposits and fibrous elements (plaques) on arterial walls. Buildup of these plaques can cause them to rupture, potentially causing a blot clot that could result in a stroke or heart attack.

The mechanisms of atherosclerosis are complex. Presently, oxidized low density lipoprotein (ox-LDL) is accepted as one of the major initiating factors that contribute to atherosclerosis. In her studies to understand how LDL contributes to the development of atherosclerosis, Dr. Cui has found that lysophosphatidic acid (LPA), one component of ox-LDL, markedly increases early growth response protein 1 (Egr-1) expression in certain types of aortic cells. Egr-1 regulates the expression of an array of genes involved in heart disease.

Dr. Cui's laboratory discovered that LPA-induced Egr-1 gene expression activates a specific set of genes, including tissue factor, which initiates blood clotting. These results establish a novel role for CREB, a protein that appears to mediate LPA-induced gene expression. These results imply that elevated LPA levels obtained from ox-LDL may exacerbate atherosclerotic plaques.

Information from Dr. Cui's research could lead to the development of new drugs and treatment for atherosclerosis.

Madhu S. Dhar

Ph.D., University of Poona, India

Associate Professor, Department of Large Animal Clinical Sciences

One refereed publication in 2006

In addition to center funds, Dr. Dhar's research is supported by the American Heart Association.

Madhu S. Dhar

Link Between Obesity and Insulin Sensitivity

Approximately 65% of Americans are obese. Obesity is a major risk factor for a number of common human disorders, including type 2 diabetes. In the last 30 years, the prevalence of type 2 diabetes has tripled, an increase that corresponds to the dramatic upsurge in obesity. However, a link between the two conditions has proved difficult to find. Dr. Dhar's research attempts to fill the gaps by focusing on the possible fundamental genetic and metabolic causes of type 2 diabetes.

Since human obesity and insulin resistance are affected by both genetic predisposition and environmental factors, these diseases can be more easily studied in mouse models and then translated into human homologues and phenotypes. Dr. Dhar developed a new mouse model and identified a single, novel candidate gene, Atp10c, affecting obesity and insulin sensitivity in mice. In mice with this gene, insulin signaling is defective, and thus insulin is not secreted. As a result, the increase in blood glucose is not compensated by its uptake into the cell, and the mice become insulin resistant. It is possible that Atp10c and its protein product play an important role in maintaining glucose homeostasis by transporting aminophospholipids. Should this hypothesis be proved correct, it has the potential to be translated into pharmaceutical therapy for clinical practice for individuals and communities at risk.

Stephen Kania

Ph.D., University of Florida

Associate Professor,
Department of Comparative Medicine

Five refereed publications in 2006

In addition to center funds, Dr. Kania's research is supported by MontVue Farms.

Stephen Kania

Staphylococci Resistance to Methicillin

The occurrence of staphylococci resistant to multiple antibiotics is an emerging problem in veterinary and human medicine. The protein responsible for methicillin resistance, penicillin binding protein 2a (PBP2a), negates the therapeutic effects of other penicillins and is genetically associated with resistance to other antibiotics. Production of PBP2a is controlled by several genes that are transferred as a cassette, the DNA sequence containing the genes.

Dr. Kania's research group characterized genetic elements that encode methicillin resistance from over 100 staphylococcal isolates. Their methicillin cassettes were typed and compared with multiple antibiotic resistance genotypes and phenotypes to study the epidemiology of resistant bacterial strains. Because of its importance in human medicine as a reportable zoonotic pathogen, *Staphylococcus aureus* isolated from veterinary samples was studied. Isolates were typed with regard to length, DNA sequence, and amino acid sequence. This information was compared to the oxacillin resistance cassette type as well as the antibiotic resistance phenotype, genotype, and host species. This information contributes to the understanding of the relative rates at which *Staphylococcus aureus* undergoes genomic mutations, integrates antibiotic resistance elements, and acquires plasmids carrying antibiotic resistance genes.

Dr. Kania's research reveals the extent to which antibiotic resistance is becoming a problem in veterinary medicine. This has important implications for companion animal health, therapeutic options for production animals and raises questions about the exchange of antibiotic resistance between animals and their owners. By developing a comprehensive and sustained research effort, he is able to elucidate antibiotic resistance trends to support the development of better tests to characterize antibiotic resistance, the study of its impact on humans, and the development of alternative strategies to control bacterial infections.

Howard K. Plummer III

Ph.D., Bowling Green State University

Assistant Professor,
Department of Pathobiology

Three refereed publications in 2006

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

Howard K. Plummer III

Joint Role of Potassium Channels and Beta-Adrenergic Signaling in Breast Cancer

Smoking is an established risk factor for breast cancer, the most common first diagnosis of cancer in women in the United States. Dr. Plummer's research group is working to determine whether certain human breast cancers are under the control of a cell surface receptor in the beta-adrenergic system, a part of the sympathetic nervous system. Studies in human cancer cell lines and in animal models have already shown that the growth of adenocarcinoma (a type of cancer) in the lung, pancreas, and colon are under control of this receptor.

High levels of potassium channels, which are under beta-adrenergic control in many cell types, have also been seen in several human cancers. However, the function of these channels in cancer cells is far from understood. Dr. Plummer's research suggests a joint role of potassium channels and beta-adrenergic signaling in the growth regulation of some cancers. His hypothesis is that potassium channels are important mediators of several of the risk factors for both breast cancer and small cell lung cancer.

Detailed knowledge of these signaling mechanisms may lead to the development of novel therapies for breast and small cell lung cancer.

Hildegard Schuller

D.V.M., Justus Liebig University, Germany

Distinguished Professor, Department of Pathobiology

Five refereed publications in 2006

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

Hildegard Schuller

Regulatory Mechanisms in Lung Cancer

East Tennessee has one of the highest lung cancer rates in the country.

Dr. Schuller's research is focused on specific receptors and pathways that regulate small cell lung carcinoma and pulmonary adenocarcinoma (PAC), and how specific toxins in cigarette smoke interact with these pathways.

Pulmonary adenocarcinoma is the most common type of non-small cell lung cancer. Two phenotypically different types of PAC exist: PAC with features of bronchiolar Clara cells (PACC) and PAC with features of alveolar type II cells (PAC-type II). PACC and PAC-type II are not under the control of the same signaling pathways.

Recent studies in Dr. Schuller's lab indicate that some widely advertised chemopreventive agents, such as green tea and beta carotene, inhibit cell growth in PACC cells, while simultaneously promoting cell growth in PAC-type II cells.

Smokers with chronic respiratory conditions are at increased risk for lung cancer. Results from Dr. Schuller's studies indicate that specific compounds found in over-the-counter medications may promote cell growth of certain cancer cells. Therefore, some of these medications may also be harmful to smokers.

Current studies are ongoing to identify signaling pathways that control the progression of premalignant lesions.

Patricia Tithof

D.V.M., Ph.D., Michigan State University

Associate Professor,
Department of Pathobiology

One refereed publication in 2006

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

Patricia Tithof

Polycyclic Aromatic Hydrocarbons and Atherosclerosis

Exposure to urban pollution is a major risk factor for the development of atherosclerosis, a process responsible for heart disease and stroke. Atherosclerosis is characterized by vascular inflammation and the formation of plaques that impede blood flow. Unstable plaques are prone to rupture, creating a clot that may cause a heart attack or stroke.

The phospholipase A2 (PLA2)/arachidonic acid cascade is a complex pathway that is responsible for the production of over 100 different inflammatory mediators. Several studies have linked the PLA2/arachidonic acid cascade to inflammation of the vascular wall, an important event in atherosclerosis.

Recently, extremely elevated levels of 12 polycyclic aromatic hydrocarbons (PAH) were present at a Superfund Site in Chattanooga, where an urban creek and its adjacent floodplain have been extensively contaminated by industrial waste. The creek floods into a residential area annually; therefore the potential for human exposure is high. Nine of the 12 compounds studied activated a novel PLA2 isoform, an enzyme that was associated with endothelial cell death, a precursor to atherosclerosis. Mice inhabiting the Superfund site had increased endothelial cell death when compared to mice inhabiting a control site.

Arachidonic acid induces endothelial cell death and adhesion molecule expression and indirectly synthesizes potent inflammatory mediators known as leukotrienes. Specifically, leukotriene B4 (LTB4) is a potent pro-inflammatory agent. Although leukotrienes and 5-lipoxygenase (5-LO), another gene involved in heart disease, are known to be important, no studies have examined whether exposure to environmental pollution, a risk factor for the development of heart disease, increases leukotriene production.

Recent studies in Dr. Tithof's laboratory indicate that exposure to high-concentrations of cigarette or environmental PAHs increases 5-LO expression and production of LTB4. Thus, exposure to PAHs may augment heart disease by targeting the leukotriene pathway. These studies may provide novel therapeutic alternatives for the treatment of heart disease associated with exposure to environmental pollution, and pharmaceutical companies are already developing leukotriene inhibitors.

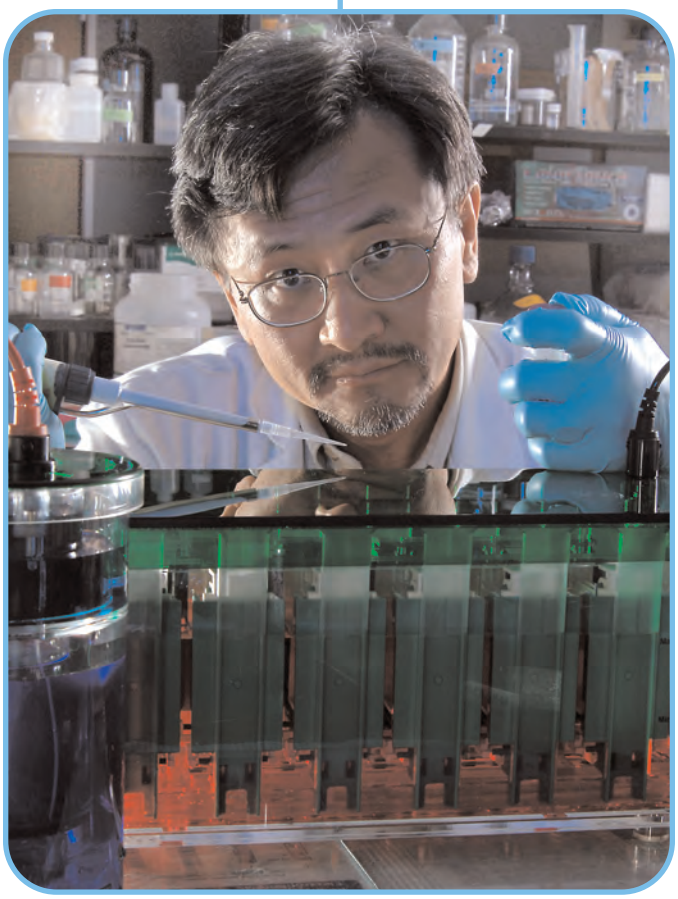
Hwa-Chain Robert Wang

B.V.M., National Chung-Hsing University, Taiwan

Ph.D., University of Virginia

Associate Professor,
Department of Pathobiology

In addition to center funds, Dr. Wang's research is supported by Philip Morris, Inc., and the National Science Foundation.



Hwa-Chain Robert Wang

Role of p33-Krs1 in Promoting Cell Survivability During Environmental Stress

A basic biological phenomenon, programmed cell death, or apoptosis, is crucial to cellular homeostasis and must be tightly regulated. Derangement of apoptosis has broad ranges of implications to human diseases. It has been estimated that apoptosis dysregulation contributes to approximately 50% of all the major medical illnesses, and blockage of programmed cell death contributes to cancer.

Dr. Wang's research program studies intracellular molecular signaling pathways that can be modulated by extracellular signals to lead cancerous cells to apoptosis or growth arrest. The ultimate goal of his project is to verify a novel signaling pathway involved in modulating the molecular events that promote cell survivability under environmental stress, such as lack of growth factors and lack of cell adhesion. A deficiency of adequate growth factors reduces cell survivability, which is involved in human degenerative diseases. An abnormal increase in cells able to grow without anchoring to a surface contributes to human tumorigenic diseases.

A novel protein, kinase responsive to stress 1 (p33-Krs1), is likely to play a role in supporting cell survivability in response to environmental stress. Dr. Wang's research team seeks to reveal genes that are specifically modulated by p33-Krs1 in order to lay the groundwork for the eventual delineation of the p33-Krs1-regulated signaling pathway. Understanding the signaling event that regulates cell viability is essential to understanding the fundamental mechanisms for developing methods to control degenerative and tumorigenic diseases.

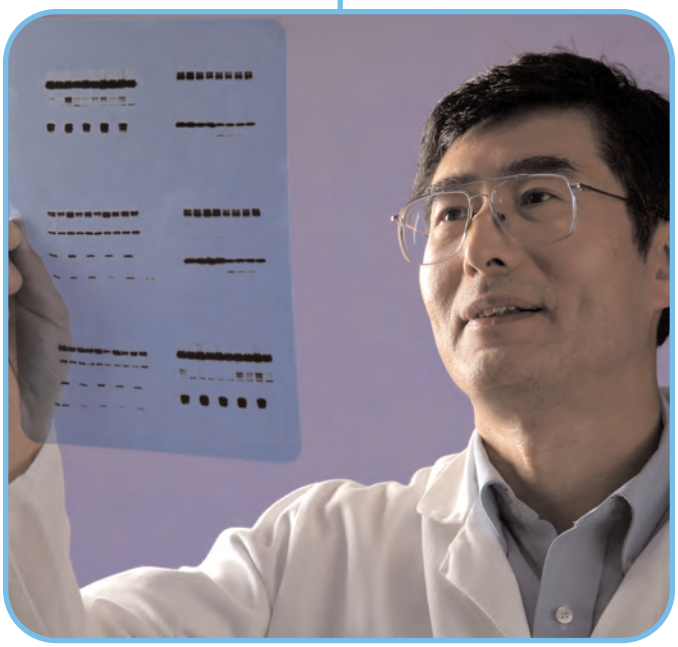
Xuemin Xu

Ph.D., Tokyo Institute of Technology, Japan

Associate Professor,
Department of Pathobiology

Three refereed publications in 2006

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



Xuemin Xu

Pathogenesis of Alzheimer's Disease

Alzheimer's disease (AD), the primary cause of dementia in the elderly, is the most devastating and progressive neurodegenerative disorder. An estimated 4.5 million Americans have Alzheimer's disease; however, there is still no cure despite the availability of drugs to alleviate some of the symptoms in the early stages of the disease. In order to develop a treatment that will halt or slow AD's progression in the early stages, we need to understand the biochemical events that cause the disease, which is the long term objective of Dr. Xu's research.

One of the characteristic features of Alzheimer's disease is the deposition of amyloid beta peptides in the brain. While the exact mechanism of how the amyloid beta peptide causes disease has not yet been definitely established, accumulating evidence supports the hypothesis that amyloid beta peptide accumulation in the brain could be a causative event in AD. Therefore, the problem of production, accumulation, and clearance of amyloid beta peptides in the brain emerges as one of the possible rational approaches for the treatment of Alzheimer's disease.

One of the goals of Dr. Xu's research is to determine how these abnormal and harmful amyloid beta peptides are produced and accumulated in the brain. Dr. Xu's research team made some major discoveries recently. First, they discovered a new, long amyloid beta peptide that contains 46 amino acids. More importantly, they determined that most of the known gamma secretase inhibitors, drugs that had been used to treat AD, hamper the formation of secreted amyloid beta-40 and -42, but cause an accumulation of the long intracellular amyloid beta 46. Dr. Xu also found that the calpain enzyme plays an important role in amyloid beta peptide degradation, or clearance. Therefore, his findings could contribute to the development of treatments and methods of AD prevention, especially those aimed at the design of gamma secretase inhibitors.

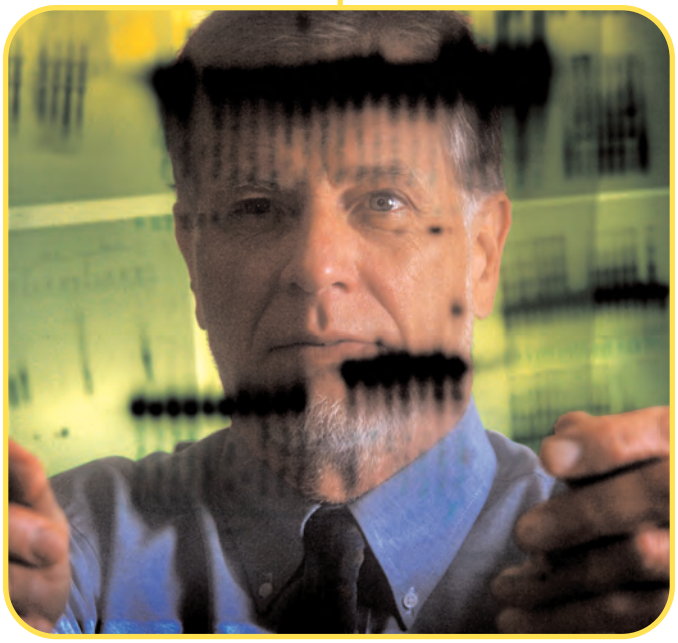
David Brian

D.V.M., Ph.D., Michigan State University

Professor, Department of Pathobiology

Two refereed publications in 2006

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



David Brian

Molecular Pathogenesis of Coronavirus

Coronavirus infections cause respiratory and gastroenteric diseases in livestock and fowl and can cause chronic, disabling diseases in humans.

In their efforts to identify methods to control coronavirus infections, researchers have been frustrated by an incomplete understanding of how coronaviruses replicate. In addition, researchers still do not understand how coronaviruses rapidly mutate into new pathogenic variants or why the animals' immune response to the coronavirus vaccination is generally weak.

The primary research focus in Dr. Brian's laboratory concerns the molecular events that occur during coronavirus replication, particularly the cis- and trans-acting factors involved in the control of RNA regulation and gene transcription. Understanding the molecular mechanisms that regulate virus replication could lead to the development of strategies designed to interrupt the process, which could lead to a cure of the virus infection. Therefore, results from Dr. Brian's ongoing studies could significantly affect the design of new therapeutic drugs.

Robert L. Donnell

D.V.M., Ph.D., University of Tennessee

Assistant Professor,
Department of Pathobiology

Five refereed publications in 2006

Robert L. Donnell

Prevalence of Malignant Catarrhal Fever in Tennessee

Malignant Catarrhal Fever (MCF) is a potentially deadly viral infection that poses a potential endemic threat to the animal agriculture industry of Tennessee. At least four species (cattle, sheep, goats, and deer) of economic consequence to Tennessee are either carriers or clinically affected by the disease. Given the viral strain variation, range of species that are susceptible, and potential for sub-clinical disease, surveillance of the prevalence and strain distribution of Malignant Catarrhal Fever has critical implications for diagnostics. The lack of knowledge regarding the prevalence of MCF in Tennessee prevents any meaningful assessment of the risk level the virus poses to the state's livestock industry.

Dr. Donnell and collaborators have gathered over 1,500 relevant samples for diagnostic testing for the virus. Using two biochemical techniques, an enzyme-linked immunosorbent assay and quantitative real-time polymerase chain reaction testing, they delineate the distribution and prevalence of the viral strains in diverse regions of the state. To date, they have found a widespread incidence of three strains of the virus. The investigators intend to educate and advise producers, wildlife managers, policy makers, and diagnosticians regarding the incidence and risk for the disease.

There is no vaccine available for this disease; therefore, control, if possible, may require segregating natural hosts from susceptible species. Given the nature of this disease agent, the study is a collaborative effort involving expertise in molecular diagnostics, pathology, food animal medicine, and wildlife medicine.
Organizations providing support through collection of samples have included the Kord Diagnostic Laboratory, USDA Enhanced BSE Surveillance, Knoxville Zoologic Gardens, the Tennessee Wildlife Resources Agency, and UT Institute of Agriculture Research and Educational centers.

Christine M. Egger

D.V.M., M.V.Sc.,
Western College of Veterinary Medicine,
Canada

Associate Professor, Department of
Small Animal Clinical Sciences

Three refereed publications in 2006

Christine M. Egger

Injectable Opioid Pain Reliever

Both medical doctors and veterinarians use opioid pain relievers to manage their patients' severe pain after surgery and for chronic pain such as that related to terminal cancer. In addition, opioid analgesics are often used for anesthesia. Opioids affect opioid receptors, which are located on the surface of nerves that transmit pain signals. One of these drugs, fentanyl, has been labeled by researchers as one of the most effective drugs for severe pain.

Dr. Egger seeks to develop an injectable, sustained release gel of fentanyl, a drug currently available only in sustained-release topical patches and oral swabs. The purpose of the gel will be to provide a depot of the drug that will slowly release into the blood stream over 7 to 10 days. Although Dr. Egger's research is in dogs, this technology has great potential for applications in human medicine.

Researchers at the University of Tennessee Health Science Center's College of Pharmacy are contributing to this project by providing materials, technical support, and expertise.

Nicholas Frank

D.V.M., Ph.D., Purdue University

Associate Professor, Department of Large Animal Clinical Sciences

Five refereed publications in 2006

In addition to center funds, Dr. Frank's research is supported by the American Quarter Horse Foundation, Lloyd Inc., and the United States Equestrian Foundation.

Nicholas Frank

Effect of Insulin Resistance on Laminitis in Horses

Insulin resistance in horses can lead to obesity, reduced energy levels, skin conditions, and laminitis, an inflammation of part of the hoof. These clinical signs of insulin resistance can make the horse uncomfortable and can threaten its health.

Dr. Frank's research focuses on insulin resistance, which can lead to type 2 diabetes, and its negative impact on the health of horses. His research group is examining the relationships between insulin resistance and laminitis in horses by studying the mechanisms involved in these disorders. They have also found that in horses, levothyroxine, a synthetic thyroid hormone, is an effective treatment for insulin resistance, which had, until recently, been controlled only by dietary alterations.

However, before horses can be treated for insulin resistance, they must first be diagnosed. Dr. Frank has developed testing procedures to assess glucose dynamics in horses, including the expression of glucose transporters in adipose and muscle tissues.

Dr. Frank's research on levothyroxine may lead to its expanded use in human treatment of diabetes.

Stephen Oliver

Ph.D., The Ohio State University

Professor, Department of Animal Science

Ten refereed publications in 2006

In addition to center funds, Dr. Oliver's research is supported by Cornell University, Pfizer Animal Health, Fort Dodge Animal Health Global Research, Epitopix LLC, the United States Department of Agriculture, and other private companies.

Prevalence, Distribution, and Antimicrobial Resistance Patterns of Pathogens on Dairy Farms

Mastitis is a complex multifactor disease that affects dairy cows worldwide. Control of mastitis is extremely difficult due to diverse types and sources of mastitis pathogens coupled with a poor understanding of bacterial and host factors. Current mastitis control programs focus primarily on hygiene, including teat disinfection, antibiotic therapy, and culling of chronically infected cows. Although these measures have led to considerable progress in controlling contagious mastitis pathogens, current mastitis control procedures are less effective against environmental pathogens such as *Streptococcus uberis*. Virulence factors associated with pathogenesis of environmental mastitis in dairy cows are not well understood, and consequently, strategies for controlling this type of mastitis are poorly defined and inadequate.

Dr. Oliver's research team developed the *Streptococcus uberis* Adhesion Molecule (SUAM), a novel bacterial protein involved in the pathogenesis of *Streptococcus uberis* mastitis. The protein facilitates bacterial adherence to bovine mammary epithelial cells.

Stephen Oliver

The SUAM has several potential applications, including use as an antigen/vaccine for prevention of *Streptococcus uberis* mastitis in dairy cows, use as a therapy in the treatment of cows with mastitis, and as a diagnostic test for detection of *Streptococcus uberis*. Discovery of non-antibiotic approaches to prevent and control environmental mastitis pathogens are likely to have huge payoffs in the near future as use of antibiotics in the dairy industry come under greater scrutiny by federal regulatory agencies.

Dr. Oliver's research on identification and characterization of *Streptococcus uberis* virulence factors resulted in a U.S. Non-Provisional Patent and a PCT International Patent.

Gina M. Pighetti

Ph.D., Pennsylvania State University

Assistant Professor,
Department of Animal Science

Two refereed publications in 2006

In addition to center funds,
Dr. Pighetti's research is supported
by private companies.

Gina M. Pighetti

Host Mechanisms that Contribute to the Pathogenesis of Mastitis

Most people enjoy the nutritional benefits of milk, cheese, and even ice cream. But in order to have high quality dairy products, cows need to be healthy. In the dairy industry, a key disease that affects both cow health and milk quality is mastitis, a bacterial infection of the mammary gland where milk is produced. Much like people, some cows tend to develop these infections more often than others.

Dr. Pighetti's lab has identified and continues to search for genetic markers that identify cows that tend to develop infections more often. Cows with the CC genotype, located on the CXCR1 receptor of the interleukin-8 peptide, develop more mastitis cases than those with the GG genotype. Interleukin-8 is a key regulator of specific white blood cell functions and is generally present in areas of active infection. Following IL-8 stimulation of these white blood cells, the increased response of adhesion molecules and migrating white blood cells is significantly impaired in cows with a CC versus a GG genotype. However, because IL-8 binds to both CXCR1 and CXCR2, it is possible the causative mutation is in either receptor or is a downstream cellular event. Dr. Pighetti's recent research has focused on identifying which of these possibilities is true.

Once determined, the dairy industry can use these genetic markers to pre-select cows and bulls that can be mated to produce offspring with greater genetic potential to be healthy. Furthermore, by understanding what processes are impaired, future therapies can be developed that target these weak links and help to prevent and/or treat mastitis. Since basic immune mechanisms are similar across animals and humans, this avenue of research also may lead to potential therapies effective in other species for reducing or preventing bacterial infections or inflammation. The primary outcomes of this research will not only better animal health, but reduce antibiotic use and potential for development of antibiotic resistance, as well as increase the quality of dairy products.

Jerry R. Roberson

D.V.M., Oklahoma State University

Ph.D., Washington State University

Associate Professor, Department of Large Animal Clinical Sciences

Jerry R. Roberson

Prevalence and Significance of Mycoplasma in Dairy Herds

Mastitis is the most costly disease in the dairy industry. Of all 50 states, Tennessee's dairy herds have the highest somatic cell counts (SCC), a reflection of mastitis. Although high SCC milk is not considered to be a human health threat, it causes decreased milk production and affects the quality and shelf-life of the milk. In severe cases, a cow can die from mastitis.

Dr. Roberson's work confirmed that *Staphylococcus aureus* is the primary pathogen associated with a high SCC and that environmental streptococci are also significant mastitis pathogens in high SCC herds. However, some SCC herds can have low levels of *Staphylococcus aureus* and environmental streptococci. In those cases, mycoplasma might be a causative factor. However, mycoplasma cannot be detected on routine milk culture media but must be kept cold and transported immediately to a test facility, which makes it logistically difficult to perform the tests.

Dr. Roberson conducted a survey this summer to evaluate the prevalence and significance of mycoplasma among herds in middle and east Tennessee dairies. So far (~50% of herds tested), no mycoplasma has been identified via routine mycoplasma culturing methods. A real-time polymerase chain reaction is being developed to allow more sensitive testing of the milk. If Tennessee dairies are to progress, measures to control these pathogens must be undertaken.

Barry Rouse

B.V.Sc., University of Bristol, England

Ph.D., University of Guelph, Canada

D.Sc., University of Bristol, England

Distinguished Professor,
Department of Pathobiology

Four refereed publications in 2006

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

Barry Rouse

Herpes Simplex Immunity

Surprisingly, the body's immunity response to some viral infections can be detrimental if not properly regulated. The classical example is corneal damage caused by the herpes simplex virus: the host's immune cells actively participate in inducing this damage, which can be painful and impede vision.

Dr. Rouse's research group recently determined that naturally occuring regulatory T cells (nTreg) play an important role in controlling the severity of herpes virus-induced corneal damage. However, the same cells were also shown to impede the protective immune response generated against numerous virus infections such as HIV, hepatitis types B and C, and herpes simplex. Dr. Rouse is working to determine the beneficial and detrimental effects of nTreg in regulating virus-induced damage and vaccine efficacy against the herpes simplex virus.

In determining the efficacy of different peptide complex vaccines against the herpes infection, Dr. Rouse demonstrated that heat shock protein 70 (hsp70), when combined with viral peptides, elicits a strong adaptive immune response against the herpes infection. Additionally, CpG, a specific region of DNA, can be used as a strong adjuvant for vaccine formulation against this infection. However, the protective efficacy of these vaccine formulations is not long lasting. Thus, future studies will address this issue.

Dr. Rouse's studies could lead to the development of drugs for treatment and prevention of herpes-induced corneal damage.

T.W. Schultz

Ph.D., University of Tennessee

Professor,
Department of Comparative Medicine

Eight refereed publications in 2006

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

T.W. Schultz

Computer-Assisted Chemical Evaluation

By using mathematical and computer models, researchers can often predict adverse health effects and better understand how a chemical might cause harm. Computational toxicology, as it is called, allows for an evaluation of a chemical before it is screened or tested.

Dr. Schultz oversees the Computational Toxicology Project at the university, a project that seeks to identify gaps in the current capabilities to model biological endpoints of interest, develop frameworks for modeling reactive and non-reactive toxicants, and develop new, high quality databases for modeling applications. Reactive toxicity involves the irreversible and often non-specific interaction of a foreign chemical with the body's indigenous molecules, including proteins, nucleic acids, and lipids. It has been identified as the major gap in the ability to predict key biological endpoints.

The Computational Toxicology Project uses general conventions of organic chemical reactions as a starting point for identifying reactivity toxicants and then develops a series of “if then” rules that are mechanism-based. These are the Roberts's Rules of Chemical Reactivity. Dr. Schultz's research group then develops and standardizes assays to quantify relative reactivity and develop databases. These databases are then used to verify the Roberts's Rules of Chemical Reactivity and define the molecular structure domains of reactivity.

Dr. Schultz's overall goal is to develop a computer-assisted chemical evaluation platform that will replace animal testing now used to evaluate chemical hazards. Results of this research can be applied to determine human skin sensitization and acute and chronic inhalation effects.

Pamela Small

Ph.D., Stanford University

Professor, Department of Pathobiology

Three refereed publications in 2006

In addition to center funds, Dr. Small's research is supported by the National Institutes of Health, the World Health Organization, and Michigan State University.

Pamela Small

Virulence of Mycobacteria

Mycobacteria are the causative agents of a number of human and animal diseases, among them Buruli ulcer, a persistent, flesh-eating skin disease. Buruli ulcer is seen in several countries but is a severe emerging infectious disease in West Africa.

Research indicates that humans do not contract *Mycobacterium ulcerans*, the causative agent of Buruli ulcer, from other humans or animals but instead, directly from the environment, possibly through a break in the skin or an insect bite. The exact mode of transmission is not yet known, but slow-moving or stagnant water appears to be a factor in transmission of the bacterium.

In the past year, Dr. Small's research group has continued to explore the virulence of mycobacteria in the *M. ulcerans* cluster. A major finding this year was the identification of a unique mycolactone in two emerging fish pathogens, *M. pseudoshottsii* in striped bass in the Chesapeake Bay, and a unique kind of *M. marinum* in the Red and Mediterranean Seas. These isolates both contain the mycolactone plasmid, the source of the principle toxic compound of *M. ulcerans*. Although these newly-identified pathogens do not cause Buruli ulcer, they are closely related to *M. ulcerans* and contribute to their own distinct diseases.

Karen M. Tobias

D.V.M., University of Illinois

Professor, Department of
Small Animal Clinical Sciences

Eight refereed publications in 2006

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

Karen M. Tobias

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 the 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 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.

Because some of the animals undergoing shunt surgery suddenly develop high blood sugar, Dr. Tobias's laboratory is also testing new ways to monitor blood sugar without taking a large blood sample. Her research group is studying human glucometers to determine whether they can be used to accurately measure low or high glucose levels in dogs.

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 clinical relief of angina.

Publications and Presentations

Seung Joon Baek

Baek SJ, Eling TE. Changes in gene expression contribute to cancer prevention by COX inhibitors. *Progress in Lipid Research*. 2006; 45:1-16.

Yamaguchi K, Liggett JL, Kim NC, **Baek SJ**. Anti-proliferative effect of horehound leaf and wild cherry bark extracts on human colorectal cancer cells. *Oncology Reports*. 2006;15:275-281.

Yamaguchi K, Lee SH, Kim JS, Wimalasena J, Kitajima S, **Baek SJ**. Activating transcription factor 3 and early growth response-1 are the novel targets of LY294002 in a PI3K independent manner. *Cancer Research*. 2006;66: 2376-2384.

Wu WW, Wang G, **Baek SJ**, et al. Comparative study of three proteomic quantitative methods, DIGE, cICAT, and iTRAQ, using 2D gel- or LC-MALDI TOF/TOF. *Journal of Proteome Research*. 2006;5:651-658.

Lee SH, Yamaguchi K, Kim JS, Eling TE, Safe S, Park Y, **Baek SJ**. Conjugated linoleic acid stimulates NAG-1 expression by isomer specific manner. *Carcinogenesis*. 2006;27:972-981.

Yamaguchi K, Lee SH, Eling TE, **Baek SJ**. A novel peroxisome proliferator-activated receptor ≥ ligand, MCC-555, induces apoptosis via posttranscriptional regulation of NAG-1 in colorectal cancer cells. *Molecular Cancer Therapeutics*. 2006;5:1352-1361.

Lambert JR, Kelly JA, Shim M, Huffer WE, Nordeen, SK, **Baek SJ**, et al. Prostate derived factor in human prostate cancer cells: Gene induction by vitamin D via a p53 dependent mechanism and inhibition of PCa cell growth. *Journal of Cellular Physiology*. 2006;208:566-574.

Martinez J, Sali T, Okazaki R, Hollingshead M, Hose C, Monks A, **Baek SJ**, et al. Drug induced up-regulation of NAG-1 attenuates tumor formation. *Journal of Pharmacology and Experimental Therapeutics*. 2006;318:899-906.

Lee SH, Kim JS, Yamaguchi K, Eling TE, **Baek SJ**. 3,3'-diindolylmethane, a major acid condensation product of indole-3-carbinol, induces expression of NAG-1 and ATF3 in colorectal cancer cells. Abstract presented at: American Association for Cancer Research 97th Annual Meeting; Apr. 2006; Washington, DC.

Yamaguchi K, Lee SH, Kim JS, Wimalasena J, Kitajima S, **Baek SJ**. Involvement of activating transcription factor 3 and early growth response-1 in LY294002-induced apoptosis in human colorectal cancer cells. Abstract presented at: American Association for Cancer Research 97th Annual Meeting; Apr. 2006; Washington, DC,

Baek, SJ. Cancer chemoprevention and NSAID activated gene. Lecture presented at: Interdisciplinary Faculty of Toxicology Spring 2006 Seminar Series; Apr. 2006; Texas A & M University, College Station, TX.

David Brian

Woo HY, Ozdarendeli A, **Brian DA**. Bovine coronavirus 5'-proximal genomic acceptor hotspot for discontinuous transcription is 65 nucleotides wide. *Journal of Virology*. 2006;80:2183-93.

Raman S, **Brian DA**. Stem-loop IV in the 5' untranslated region is a cis-acting element in bovine coronavirus defective interfering RNA replication. *Journal of Virology*. 2006;19:12434-46.

Mei-Zhen Cui

Dong Y, Tan J, **Cui M-Z**, et al. Calpain inhibitor MDL28170 modulates Aβ formation by inhibiting the formation of intermediate Aβ 46 and protecting β from degradation. *The Federation of American Societies of Experimental Biology Journal*. 2006;20:331-333.

Xie Z, Dong Y, Zhang M, **Cui M-Z**, et al. Activation of protein kinase C-zeta by peroxynitrite regulates LKB1-dependent AMP-activated protein kinase in cultured endothelial cells. *Journal of Biological Chemistry*. 2006;281:6366-6375.

Cui M-Z, Laag E, Sun L, et al. Lysophosphatidic acid induces early growth response gene 1 expression in vascular smooth muscle cells, CRE and SRE mediate the transcription. *Arteriosclerosis, Thrombosis, and Vascular Biology*. 2006;26:1029-1035.

Zhao G, Tan J, Mao G, **Cui M-Z**, Xu X. The sequential relationship of the multi intramembrane cleavages of APP suggests a single enzyme model. *Journal of Neurochemistry*. 2006. In press.

Zhao GJ, Sun LS, Tan JX, Mao GZ, **Cui M-Z**, Xu XM. A beta 46 is generated in the Golgi/Trans-Golgi network in Neuro 2a cells [abstract]. *Federation of American Societies of Experimental Biology Journal*. 2006;20:A49 Part 1.

Sun L, Tan MQ, Hao F, Xu X, Donnell R, **Cui M-Z**. Lysophosphatidic acid induces Egr-1 expression in vivo in a mouse model [abstract]. *Arteriosclerosis, Thrombosis, and Vascular Biology*. 2006;26:E62.

Tan MQ, Hao F, Sun LS, Xu X, **Cui M-Z**. Lysophosphatidylcholine activation of protein kinase D2 in THP-1 monocytic cells [abstract]. *Arteriosclerosis, Thrombosis, and Vascular Biology*. 2006;26:E90.

Madhu S. Dhar

Dhar MS, Yuan JS, Elliott, SB, et al. A type IV P-type ATPase affects insulin-mediated glucose uptake in adipose tissue and skeletal muscle in mice. *Journal of Nutritional Biochemistry*. In press.

Reaves HE, Sommardahl CS, Haines DK, Yuan JS, **Dhar MS**. Insulin signaling pathway in a novel mouse model of type 2 diabetes. Presented at: 46th Annual Meeting of The American Society of Cell Biology; Dec. 2006; San Diego, CA.

Dhar MS, Yuan JS, Elliott SB, et al. A type IV P-type ATPase affects insulin-mediated glucose uptake in adipose tissue and skeletal muscle in mice. Presented at: Keystone Symposia on Adipogenesis, Obesity, and Inflammation; Jan. 2006; Vancouver, British Columbia.

Robert L. Donnell

Mawby D, Krahwinkle DJ, **Donnell RL**, et al. Segmental tracheal dysplasia in a mixed breed dog. *Canadian Veterinary Journal*. In press.

Frank N, Andrews F, Sommardahl C, Eiler H, Rohrbach B, **Donnell RL**. Evaluation of the combined dexamethasone suppression/thyrotropin-releasing hormone stimulation test for detection of pars intermedia pituitary adenomas in horses. *Journal of Veterinary Internal Medicine*. 2006;20:987-993.

Frank LA, **Donnell RL**, Kania SA. Oestrogen receptor evaluation in Pomeranian dogs with hair cycle arrest (alopecia X) on melatonin supplementation. *European Journal of Dermatology*. 2006;17:252-8.

Buchanan B, **Donnell RL**, Moore R, et al. Pyloric outflow obstruction secondary to a pyloric-duodenal intussusception in a 15 year old Tennessee Walking Horse mare: What's your diagnosis?. *Journal of the American Veterinary Medical Association*. 2006; 228:1339-40.

Sargent SJ, Frank LA, Buchanan BR, **Donnell RL**, et al. Otoscopic, cytologic, and microbiologic examination of the equine external ear canal. *European Journal of Dermatology*. 2006;17:175-81.

Sun L, Tan M, Hao F, Xu X, **Donnell RL**, et al. Lysophosphatidic acid induces Egr-1 expression in vivo in a mouse model. Poster presented at: 7th Annual Conference on Arteriosclerosis, Thrombosis, and Vascular Biology; Apr. 2006; Denver, CO.

Holder T, Schumacher J, Rorhbach R, **Donnell RL**, et al. The effect of hyperbaric oxygen on full thickness sheet grafts applied to fresh and granulating wounds of horses. Poster presented at: Annual Conference on Veterinary Internal Medicine; 2006.

Donnell RL. Veterinary diagnostic forensics. Presented at: Knox County Animal Abuse Task Force; Jan. 2006; Knoxville, TN.

Donnell RL. Veterinary forensic pathology. Presented at: Pro Bono's Animal Law Project and Criminal Law Society; Mar. 2006; University of Tennessee College of Law, Knoxville, TN.

Donnell RL. Malignant Catarrhal Fever in Tennessee. Presented at: Upper Cumberland Plateau Veterinary Association; Jan. 2006; TN.

Donnell RL. Intracerebral oligodendroglioma in a lion. Presented at: Southeastern Veterinary Pathology Conference; May 2006; Tifton, GA.

Christine M. Egger

Egger C, Glerum L, Haag KM, et al. Efficacy and cost-effectiveness of transdermal fentanyl patches for the relief of postoperative pain in dogs after cruciate ligament rupture or pelvic limb fracture repair. *Veterinary Anaesthesia and Analgesia*. In press.

Castro P, **Egger C**, Redua M, et al. Effect of ketamine, magnesium and ketamine/magnesium on isoflurane MAC in goats. *American Journal of Veterinary Research*. In press.

Redua M, Doherty T, Castro-Queiroz P, **Egger C**, et al. Effect of intravenous lidocaine and ketamine on isoflurane minimum alveolar concentration in goats. *Veterinary Anaesthesia and Analgesia*. In press.

Egger C. Anaesthetic complications, accidents and emergencies. In: Seymour C, Duke T, eds. *BSAVA Manual of Small Animal Anaesthesia and Analgesia*. 3rd ed. In press.

Egger C. The equine autonomic nervous system. In: Doherty T, Valverde A, eds. *Manual of Equine Anesthesia and Analgesia*. Oxford, UK: Blackwell Publishing; 2006:80-85.

Nicholas Frank

Nadeau JA, **Frank N**, Valipe SR, et al. Blood lipid, glucose, and insulin concentrations in Morgan horses and Thoroughbreds. *Journal of Equine Veterinary Science*. In press.

Frank N, Andrews FM, Sommardahl C, et al. Evaluation of the combined dexamethasone suppression / thyrotropin-releasing hormone (TRH) stimulation test for the diagnosis of pituitary pars intermedia dysfunction in horses. *Journal of Veterinary Internal Medicine*. 2006;20:987-993.

Coffer NJ, **Frank N**, Elliott SB. Effects of dexamethasone and isoflupredone acetate on plasma potassium concentrations and other biochemical measurements in early lactation cows. *American Journal of Veterinary Research*. 2006;67:1244-1251.

Frank N, Elliott SB, Brandt LE, et al. Physical characteristics, blood hormone concentrations, and plasma lipid concentrations in obese insulin resistant horses. *Journal of the American Veterinary Medical Association*. 2006;228:1383-1390.

Frank N, Elliott SB, Allin SB, et al. Blood lipid concentrations and lipoprotein profiles in captive and wild American black bears (Ursus americanus). *American Journal of Veterinary Research*. 2006;67:335-341.

Frank N, Dhar M, Elliott SB, et al. Effects of long-term levothyroxine administration on adipose and skeletal muscle tissue glucose transporter gene expression in mares [abstract]. *Journal of Veterinary Internal Medicine*. 2006;20:743.

Frank N. Equine metabolic syndrome. Presented at: Peterson Smith Continuing Education Series; Jun. 2006; Ocala, FL.

Frank N. Equine metabolic syndrome: What is it and how do we treat it? Panel discussion presented at: American College of Veterinary Internal Medicine 24th Annual 2006 Forum; Jun. 2006; Louisville, KY.

Frank N. Diseases of the neonatal foal. University of Tennessee College of Veterinary Medicine Horse Owner's Seminar; Jan. 2006; Knoxville, TN.

Stephen Kania

Keller RL, **Kania SA**, Hendrix DV, et al. Evaluation of canine serum for the presence of anti-retinal autoantibodies in Sudden Acquired Retinal Degeneration Syndrome. *Journal of Veterinary Ophthalmology*. 2006;9:195-200.

Frank LA, Donnell RL, **Kania SA**. Oestrogen receptor evaluation in Pomeranian dogs with hair cycle arrest (alopecia X) on melatonin supplementation. *Veterinary Dermatology*. 2006;17:252-8.

Kennedy, MA, Moore E, Wilkes RP, Citino SB, **Kania SA**. Analysis of genetic mutations in the 7a7b open reading frame of coronavirus of cheetahs (Acinonyx jubatus). *American Journal of Veterinary Research*. 2006;67:627-32.

Bemis DA, Jones RD, Hiatt LE, Ofori ED, Rohrbach BW, Frank LA, **Kania SA**. Comparison of tests to detect oxacillin resistance in canine isolates of *Staphylococcus intermedius*, *Staphylococcus schleiferi* and *Staphylococcus aureus* isolates from canine hosts. *Journal of Clinical Microbiology*. 2006;44:3374-3376.

Pickens K, **Kania SA**, Cheng M. Effects of colchicines and oryzalin on callus and adventitious shoot formation of Euphorbia pulchurrima "Winter rose" Rose. *HortScience*. In press.

Kania SA, Hiatt LE, Johnson L, et al. Coagulase gene variability in *Staphylococcus aureus* isolated from animals. Presented at: 21st Annual Congress of the ESVD-ECVD; Sept. 2006; Lisbon, Portugal.

Stephen Oliver

Murinda SE, **Oliver SP**. Physiologic and molecular markers for detection of Shiga toxin-producing *Escherichia coli* serotype O26 strains. *Foodborne Pathogens & Disease*. 2006;3:163-177.

Borm AA, Fox LK, Leslie KE, Hogan JS, Andrew SM, **Oliver SP**, et al. Effects of prepartum intramammary antibiotic therapy on udder health, milk production, and reproductive performance in dairy heifers. *Journal of Dairy Science*. 2006;89:2090-2098.

Almeida RA, Luther DA, Park HM, **Oliver SP**. Identification, isolation, and partial characterization of a novel *Streptococcus uberis* adhesion molecule (SUAM). *Veterinary Microbiology*. 2006;115:183-191.

Tamilselvam B, Almeida RA, Dunlop JR, **Oliver SP**. *Streptococcus uberis* internalizes and persists in bovine mammary epithelial cells. *Microbial Pathogenesis*. 2006; 40:279-285.

Dogan B, Klaessig S, Rishniw M, **Oliver SP**, et al. Adherent and invasive *Escherichia coli* are associated with persistent bovine mastitis. *Veterinary Microbiology*. 2006;116:270-82.

Straley BA, Donaldson SC, Hedge NV, Sawant AA, Srinivasan V, **Oliver SP**, et al. Public health significance of antimicrobial Gram-negative bacteria in raw bulk tank milk. *Foodborne Pathogens & Disease*. 2006;3:222-233.

Srinivasan V, Sawant AA, Gillespie BE, Headrick SJ, Ceasaris L, **Oliver SP**. Prevalence of enterotoxin and toxic shock syndrome toxin genes in *Staphylococcus aureus* isolated from milk of cows with mastitis. *Foodborne Pathogens & Disease*. 2006;3:274-283.

Murinda SE, Nguyen LT, Ivey SJ, Meleo P, **Oliver SP**. Potential of antimicrobial agents to inhibit fungi from cull dairy cow fecal samples on *Campylobacter* isolation media. *Foodborne Pathogens & Disease*. 2006;3:309-312.

Richards HA, Conesa DP, Doane CA, Gillespie BE, Mount JR, **Oliver SP**, et al. Genetic characterization of a diverse *Escherichia coli* O157:H7 population collected from a variety of farm environments. *Foodborne Pathogens & Disease*. 2006;3:259-265.

Almeida RA, **Oliver SP**. Trafficking of *Streptococcus uberis* in bovine mammary epithelial cells. *Microbial Pathogenesis*. 2006;41:80-89.

Oliver SP. Biotechnology and the dairy industry. *Dairy Herd Management*. Feb. 2006.

Oliver SP. Foodborne pathogens in milk and the dairy farm environment. *Dairy Herd Management*. Aug. 2006.

Jayarao B, Straley B, Donaldson S, Hedge N, Sawant A, Velusamy S, and **Oliver SP**. Public health significance of antimicrobial resistant Gram-negative bacteria in bulk tank milk. In: National Mastitis Council 45th Annual Meeting Proceedings; Jan. 2006; Tampa, FL:10-26. Abstract.

Cesaris L, Gillespie BE, Srinivasan V, Almeida RA, Zecconi A, **Oliver SP**. Discriminating between strains of *Escherichia coli* using pulsed-field gel electrophoresis and Box PCR. In: National Mastitis Council 45th Annual Meeting Proceedings; Jan. 2006; Tampa, FL:252-253. Abstract.

Almeida RA, Patel DA, Friton GM, **Oliver SP**. Intracellular killing of mastitis pathogens by penethamate hydriodide following internalization into mammary epithelial cells. In: National Mastitis Council 45th Annual Meeting Proceedings; Jan. 2006; Tampa, FL:272-273. Abstract.

Sawant A, Srinivasan V, Gillespie BE, Headrick SE, Lewis MJ, **Oliver SP**. Retrospective comparison of antimicrobial susceptibility of *Sreptococcus uberis* isolated from dairy cattle and associated antimicrobial usage. In: National Mastitis Council 45th Annual Meeting Proceedings; Jan. 2006; Tampa, FL:306-307. Abstract.

Srinivasan V, Nam HM, Headrick SJ, Gillespie BE, Nguyen LT, **Oliver SP**. Prevalence and antimicrobial susceptibility of coagulase-negative *Staphylococcus* species isolated from the dairy farm environment. In: National Mastitis Council 45th Annual Meeting Proceedings; Jan. 2006; Tampa, FL:292-293. Abstract.

Oliver SP, Gillespie BE, Tamilselvam B, et al. Bovine mammary epithelial cell β-defensins: Antibacterial activity against veterinary and foodborne pathogens. In: National Mastitis Council 45th Annual Meeting Proceedings; Jan. 2006; Tampa, FL:228-229. Abstract.

Gillespie BE, Headrick SI, Lewis MJ, **Oliver SP**. Prevalence of coagulase-negative *Staphylococcus* species from three Tennessee dairy research herds. In: National Mastitis Council 45th Annual Meeting Proceedings; Jan. 2006; Tampa, FL:296-297. Abstract

Srinivasan V, Sawant A, Gillespie BE, Headrick SI, Ceasaris L, **Oliver SP**. Characterization of enterotoxin and toxic shock syndrome genes in *Staphylococcus aureus* isolated from milk of cows with mastitis. In: National Mastitis Council 45th Annual Meeting Proceedings; Jan. 2006; Tampa, FL:230-231. Abstract.

Oliver SP. Tennessee quality milk initiative. Seminar presented to: Tennessee Agricultural Experiment Station Dairy Advocacy Group; Mar. 2006; Knoxville, TN.

Oliver SP. Zoonotic diseases, agroterrorism and biosecurity. Seminar presented at: The University of Tennessee College of Nursing; Apr. 2006; Knoxville, TN.

Oliver SP. Tennessee quality milk initiative. Seminar presented at: The University of Tennessee Department of Animal Science; Apr. 2006; Knoxville, TN.

Oliver SP. Heifer mastitis and the epidemiology and ecology of *Streptococcus uberis*. Seminar presented at: Morrinsville Animal Health Centre; Jun. 2006; Morrinsville, New Zealand.

Oliver SP. Heifer mastitis and recent research on *Streptococcus uberis*. Seminar presented at: Edgecombe Dairy Farmer's Seminar; Jun. 2006; Whakatane, New Zealand.

Oliver SP. *Streptococcus uberis* pathogenesis and associated virulence factors. Seminar presented at: AgResearch Wallaceville; Jun. 2006; Upper Hutt, New Zealand.

Oliver SP. Strategies for controlling *Streptococcus uberis* mastitis in heifers and cows. Seminar presented at: Schering Plough Animal Health; Jun. 2006; Upper Hutt, New Zealand.

Oliver SP. Vaccination strategies for the prevention of *Escherichia coli* intramammary infections in dairy cows during the peripartum period. Seminar presented at: Epitopix LLC; Jul. 2006; Wilmar, MN.

Oliver SP. Sustainability of current mastitis practices [Woody Pankey Memorial Keynote Address]. Presented at: SAMM Milk Quality Conference; Jun. 2006; Rotorua, New Zealand.

Oliver SP. Challenges faced by current use of antimicrobials. Seminar presented at: SAMM Milk Quality Conference; Jun. 2006; Rotorua, New Zealand.

Oliver SP. Ecology of *Streptococcus uberis*: Lessons from confinement housing systems. Seminar presented at SAMM Milk Quality Conference; Jun. 2006; Rotorua, New Zealand.

Oliver SP. *Streptococcus uberis* mastitis -- an update on the latest U.S. research. Seminar presented at: Dexcel; Jun. 2006; Hamilton, New Zealand.

Oliver SP. Mastitis research at The University of Tennessee Dairy Research and Education Center. Seminar presented at: American Jersey Cattle Association Annual Meeting; Jun. 2006; Lewisburg, TN.

Gina M. Pighetti

Rambeaud M, Clift R, **Pighetti GM**. Association of a bovine CXCR2 gene polymorphism with neutrophil survival and killing ability. *Veterinary Immunology and Immunopathology*. In press.

Pighetti GM, Rambeaud M. Genome conservation between the bovine and human interleukin-8 receptor complex: Improper annotation of bovine interleukin-8 receptor b identified. *Veterinary Immunology and Immunopathology*. In press.

Scenna FN, Edwards JL, **Pighetti GM**, et al. Prostaglandin F2α receptor messenger RNA and protein expression in pre-implantation *In-Vitro* bovine embryos. Presented at: International Embryo Transfer Society 32nd Annual Conference; Jan. 2006; Orlando, FL.

Pighetti GM. Selecting for disease resistance: Fact or fiction? Seminar presented at: National Mastitis Council 45th Annual Meeting; Jan. 2006; Tampa, FL.

Pighetti GM. Identifying markers and mechanisms associated with increased disease susceptibility. Presented at: American Association of Lab Animal Science Appalachian Regional Meeting; Jan. 2006; Knoxville, TN.

Pighetti GM. Immunity and disease resistance - links to a bovine chemokine receptor. Presented at: The University of Tennessee Department of Microbiology Seminar Series; Jan. 2006; Knoxville, TN.

Howard K. Plummer III

Cekanova M, Masi T, **Plummer III HK**, et al. Pulmonary fibroblasts stimulate the proliferation of cell lines from human lung adenocarcinomas. *Anti-Cancer Drugs*. 2006;17:771-781.

Li Y, Urban JM, Cayer ML, **Plummer III HK**, et al. Actin-based features negatively regulated by protein kinase C-epsilon. *American Journal of Physiology-Cell Physiology*. In press.

Dhar MS, **Plummer III HK**. Protein expression of G-protein inwardly rectifying potassium channels (GIRKs) in breast cancer cells. *BMC Physiology*. 2006;6:8.

Hance M, **Plummer III HK**. Tobacco carcinogens stimulate different signaling pathways in breast cancer. Poster accepted for: 46th Annual Meeting of the American Society for Cell Biology; Dec. 2006; San Diego, CA.

Jerry R. Roberson

Roberson JR. Bovine foot diseases. Presented at: Central Veterinary Conference; Aug. 2006; Kansas City, MO.

Roberson JR. Bovine muscular diseases. Presented at: Central Veterinary Conference; Aug. 2006; Kansas City, MO.

Roberson JR. Mastitis treatment: Does anything really work? Presented at: Central Veterinary Conference; Aug. 2006; Kansas City, MO.

Roberson JR. Prolapses: When things come out that shouldn't. Presented at: Central Veterinary Conference; Aug. 2006; Kansas City, MO.

Roberson JR. Success and failures with downer cows. Presented at: Central Veterinary Conference; Aug. 2006; Kansas City, MO.

Roberson JR. Treating bovine gastrointestinal diseases. Presented at: Central Veterinary Conference; Aug. 2006; Kansas City, MO.

Barry Rouse

Kalia V, Sarkar S, Goniley TS, **Rouse BT**, et al. Differentiation of memory B and T cells. *Current Opinion in Immunology*. 2006;18:255-264.

Suvas S, **Rouse BT**. Treg control of antimicrobial T cell responses. *Current Opinion in Immunology*. 2006;18:344-348.

Banerjee K, **Rouse BT**. Immunopathological aspects of HSV infection. In: Arvin M, Campadelli-Fume G, Mocarski E, et al., eds. *Human Herpesviruses: Biology, Therapy and Immunoprophylaxis*. Cambridge, UK: Cambridge University Press; 2006.

Pack CD, **Rouse BT**. Immunity to herpes simplex virus: Present but not perfect. In: Sandri-Golding RM, ed. *Alpha Herpesviruses: Pathogenesis, Molecular Biology and Infection Control*. United Kingdon: Caister Academic Press; 2006: Chap. 18.

Ahmed R, **Rouse BT**. Immunological memory. *Immunological Reviews*. 2006;211:5-7.

Li X, Vanitha DJ, Joo HM, He Y, **Rouse BT**, et al. A strategy for selective, CD4+ T cell-independent activation of virus-specific memory B cells for limiting dilution analysis. *Journal of Immunological Methods*. In press.

Rouse BT. Immunology. Presented at: 31st Annual International Herpesvirus Workshop; July 2006; Seattle, WA.

Rouse BT. T regulatory cells in HSV immunity and immunopathology. Presented at: National Institutes of Health Workshop; Sept. 2006; Cincinnati, OH.

Hildegard Schuller

Schuller HM. Tobacco associated lung cancer. In: Cho CH, Purohit V. Alcohol, *Tobacco, and Cancer*. Basel, Switzerland: S. Karger; 2006: 205-228.

Al-Wadei HAN, Takahashi T, **Schuller HM**. Growth stimulation of human pulmonary adenocarcinoma cells and small airway epithelial cells by beta-carotene via activation of cAMP, PKA, CREB, and ERK1/2. *International Journal of Cancer*. 2006;118:1370-1380.

Laag E, Majidi M, Cekanova M, Masi T, Takahashi T, **Schuller HM**. NNK stimulates ERK1/2 and CREB/ATF-1 phosphorylation via β_1-AR and EGFR signaling in human lung adenocarcinoma and small airway epithelial cells. *International Journal of Cancer*. 2006;119:1547-1552.

Schuller HM, Kabalaka G, Smith G, et al. Detection of over-expressed COX-2 in precancerous lesions of hamster pancreas and lungs by molecular imaging: implications for early diagnosis and prevention. *ChemMedChem*. 2006;1:603-610.

Askari MDF, Tsao MS, Cekanova M, **Schuller HM**. Ethanol and the tobacco-specific carcinogen, 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK) contribute to signaling in immortalized human pancreatic duct epithelial cells. *Pancreas*. 2006;33:53-62.

T.W. Schultz

Aptula AO, Roberts DW, Patlewicz G, **Schultz TW**. Non-enzymatic glutathione reactivity and in vitro toxicity: A non-animal approach to skin sensitization. *Toxicology in Vitro*. 2006;20:239-247.

Wan B, Fleming JT, **Schultz TW**, Sayler GS. In vitro immune toxicity of depleted uranium: Effects on murine macrophages, CD4+ T-cells and gene expression profiles. *Environmental Health Perspectives*. 2006;114:85-91.

Dawson DA, Pöch G, **Schultz TW**. Chemical mixture toxicity testing with Vibrio fischeri: Combined effects of binary mixtures of ten soft electrophiles. *Ecotoxicology Environmental Safety*. 2006;65:171-180.

Schultz TW, Yarbrough JW, Koss SK. Identification of reactive toxicants: Structure-activity relationships for amides. *Cell Biology and Toxicology*. 2006;22:339-349.

Kahn I, Maran U, Benfenati E, Netzeva TI, **Schultz TW**, Cronin MTD. Comparative quantitative structure-activity relationships for toxicity to Tetrahymena pyriformis and Pimephales promelas. *Alternatives to Laboratory Animals*. In press.

Schultz TW, Carlson RE, Cronin MTD, et al. A conceptual framework for predicting toxicity of reactive chemicals: Models for soft electrophilicity. *SAR and QSAR in Environmental Research*. 2006;17:413-428.

Schultz TW, Yarbrough JW, Pilkington T. Aquatic toxicity and abiotic thiol reactivity of aliphatic isothiocyanates: Effects of alkyl-size and -shape. *Environmental Toxicology and Pharmacology*. In press.

Schultz TW, Hewitt M, Netzeva TI, Cronin MTD. Assessing applicability domains of toxicological QSARs: Definition, confidence in predicted values, and the role of mechanisms of action. *QSAR and Combinatorial Sciences*. In press.

Schultz TW, Mekenyan OG. Response-surface analyses: An overview of an approach to predicting acute toxicity. In: Walker JD, ed. *QSARs for Predicting Ecological Effects of Chemicals*. CRC Press, Boca Raton, FL. In press.

Schultz TW, Roberts DW, Cronin MTD. QSAR analyses of the toxicity of selected nitrobenzenes and halogenated nitrogen heterocyclics to Tetrahymena pyriformis. In: Walker JD, ed. *QSARs for Predicting Ecological Effects of Chemicals*. CRC Press, Boca Raton, FL. In press.

Schultz TW, Veith GD. Modeling reactive toxicity. Presented at: Leadscope In Silico Toxicity Consortium Meeting; 2006; Bethesda, MD.

Aptula AO, **Schultz TW**, Ralston KE, et al. QSAR analysis of abiotic thiol reactivity and aquatic toxicity of halo-substituted-carbonyl compounds. Presented at: 12th Workshop on QSAR in Environmental Sciences; 2006; Lyon, France.

Pavan M, Netzeva TI, **Schultz TW**, Worth AP. QSAR consensus approach and its application to the mechanism of toxic action to fish. Presented at: 12th Workshop on QSAR in Environmental Sciences; 2006; Lyon, France.

Hewitt M, Cronin MTD, Netzeva TI, **Schultz TW**. The need for mechanism of action in applicability domains for ecotoxicology (Q)SARs. Presented at: 12th Workshop on QSAR in Environmental Sciences; 2006; Lyon, France.

Dimitrov S, Koleva Y, **Schultz TW**, et al. Inter-species models for acute aquatic toxicity based on mechanism of action. Presented at: 12th Workshop on QSAR in Environmental Sciences; 2006; Lyon, France.

Ruusmann V, **Schultz TW**, Maran U. Use of four theoretical molecular descriptors for the classification of aliphatic and aromatic chemicals in the Tetrahymena pyriformis assay. Presented at: 12th Workshop on QSAR in Environmental Sciences; 2006; Lyon, France.

Schultz TW, Cronin MTD. Does a complex battery of models help predict toxicity? Presented at: 12th Workshop on QSAR in Environmental Sciences; 2006; Lyon, France.

Schultz TW. The Knoxville workshops on reactive toxicity: Relationships with aquatic toxicity. Presented at: McKim Conference on Aquatic Toxicology; 2006; Duluth, MN.

Pamela L.C. Small

Rybniker J, Kramme S, **Small PLC**. Host range of 14 mycobacteriophages in *M. ulceransi* and seven other mycobacteria including *Mycobacterium tuberculosis*. *Journal of Medical Microbiology*. 2006;55:37-42.

Merritt RW, Benbow ME, **Small PLC**. Unraveling a mysterious disease associated with aquatic insects and their environments. *Frontiers in Ecology and the Environment*. 2006;3:323-331.

Ranger BS, Mahrous EA, Mosi L, Adusumilli S, Lee RE, Colorni A, Rhodes M, **Small PLC**. Globally distributed mycobacterial fish pathogens produce a novel plasmid-encoded toxic macrolide, mycolactone F. *Infection and Immunity*. In press.

Small PLC. Vaccine development for prevention of *Mycobacterium ulcerans* disease. Presented at: Annual World Health Organization Meeting on Buruli Ulcer; Mar. 2006; Geneva, Switzerland.

Small PLC. Session head and presenter at: American Society for Microbiology General Meeting; May 2006; Orlando, FL.

Patricia Tithof

Brant K, Guan W, **Tithof P**, Loch-Caruso R. Gestation age-related increase in 50 kD rat uterine calcium-independent phospholipase A2 expression influences uterine sensitivity to polychlorinated biphenyl stimulation. *Biology of Reproduction*. 2006;74:874-880.

Karen M. Tobias

Gassel AD, **Tobias KM**, Cox SK. Disposition of deracoxib in cats after oral administration. *Journal of the American Animal Hospital Association*. 2006;42:212-217.

Burger D, Carrier A, **Tobias KM**. How to perform a surgical hepatic biopsy. *Veterinary Medicine*. 2006;101:306-312.

Smrkovski OA, LeBlanc AK, Smith SH, LeBlanc CJ, Adams WH, **Tobias KM**. Carcinoma ex pleomorphic adenoma with sebaceous differentiation in the mandibular salivary gland of a dog. *Veterinary Pathology*. 2006;43:374-377.

Shuler E, **Tobias KM**. Key gastrointestinal surgeries: *Gastrotomy*. *Veterinary Medicine*. 2006;101:207-210.

Watson K, **Tobias KM**. Key gastrointestinal surgeries: Incisional gastroplexy. *Veterinary Medicine*. 2006;101:213-219.

Brandt L, **Tobias KM**. Key gastrointestinal surgeries: Intestinal biopsy. *Veterinary Medicine*. 2006;101:220-224.

Tobias KM, Ayres R. Key gastrointestinal surgeries: Intestinal anastomosis. *Veterinary Medicine*. 2006;101:226-229.

Anderson E, **Tobias KM**. Key gastrointestinal surgeries: Omentalization. *Veterinary Medicine*. 2006;101:230-233.

Tobias KM. *Portosystemic shunts*. *Live at Five*. WBIR Knoxville/NBC television. Jun. 2006.

Tobias KM. Abdominal surgery tips and tricks. Presented at: Florida Academy of Veterinary Medicine; Mar. 2006; Orlando, FL.

Tobias KM. Feeding tubes. Presented at: Florida Academy of Veterinary Medicine; Mar. 2006; Orlando, FL.

Tobias KM. Omentum. Presented at: Florida Academy of Veterinary Medicine; Mar. 2006; Orlando, FL.

Tobias KM. Perineal surgery tips and tricks. Presented at: Florida Academy of Veterinary Medicine; Mar. 2006; Orlando, FL.

Tobias KM. Wound management and reconstruction. Presented at: Florida Academy of Veterinary Medicine; Mar. 2006; Orlando, FL.

Tobias KM. Portosystemic shunts. Presented at: Florida Academy of Veterinary Medicine; Mar. 2006; Orlando, FL.

Tobias KM. Soft tissue case presentations. Presented at: Florida Academy of Veterinary Medicine; Mar. 2006; Orlando, FL.

Tobias KM. Acute cranial lymphadema in a dog. Presented at: Society of Veterinary Soft Tissue Surgery Meeting; Jun. 2006; Beaver Creek, CO.

Tobias KM. Adrenal function in normal dogs and dogs with congenital portosystemic shunts. Presented at: Society of Veterinary Soft Tissue Surgery Meeting; Jun. 2006; Beaver Creek, CO.

Tobias KM. Experts panel on portosystemic shunts. Presented at: Society of Veterinary Soft Tissue Surgery Meeting; Jun. 2006; Beaver Creek, CO.

Holford A, **Tobias KM**. Results of ACTH stimulation tests in normal dogs and dogs with congenital portosystemic shunts. In: Proceedings of the Society of Veterinary Soft Tissue Surgery Meeting; Jun. 2006; Beaver Creek, CO. Abstract.

Tobias KM. Acute cranial lymphedema following circumferential cervical constriction. In: Proceedings of the Society of Veterinary Soft Tissue Surgery Meeting; Jun. 2006; Beaver Creek, CO. Abstract.

Lewis C, **Tobias KM**. Rectal perforation in dogs and cats; outcome of surgical repair. Poster presented at: 2006 Merck/Merial Veterinary Scholars Program Symposium; Aug. 2006; Baton Rouge, LA.

Tobias KM. Peritonitis. Presented at: Florida Academy of Veterinary Medicine; Mar. 2006; Orlando, FL.

Tobias KM. Gastric dilatation and volvulus. Presented at: Florida Academy of Veterinary Medicine; Mar. 2006; Orlando, FL.

Tobias KM. Use of synthetic and biologic implants for reconstruction. In: Proceedings of the American Veterinary Medical Association Annual Convention; Jul. 2006; Honolulu, HI. Abstract.

Tobias KM. Absorbable cyanoacrylates : Closure of lung and kidney lacerations. In: Proceedings of the American Veterinary Medical Association Annual Convention; Jul. 2006; Honolulu, HI. Abstract.

Tobias KM. Use of multifenestrated continuous suction drains: Beyond wound drainage. In: Proceedings of the American Veterinary Medical Association Annual Convention; Jul. 2006; Honolulu, HI. Abstract.

Tobias KM. Extravascular shunt attenuation: Constrictors, bands, and occluders. In: Proceedings of the American Veterinary Medical Association Annual Convention; Jul. 2006; Honolulu, HI. Abstract.

Tobias KM. Hepatic microvascular dysplasia or portal atresia. American College of Veterinary Surgeons Web site. Available at: http://www.acvs.org/AnimalOwners/ HealthConditions/SmallAnimalTopics/HMD/. Accessed Sept. 1, 2006.

Tobias KM. Comparison of meloxicam and buprenorphine for analgesia in cats. *Trends Magazine*. Jan. 2006.

Hwa-Chain Robert Wang

Wei J, Siriwardhana NS, Chen Y, **Wang H-CR**. Analysis and prevention of human breast cell carcinogenesis induced by NNK and B[a]P. In: Proceedings of the American Association for Cancer Research Meeting; Apr. 2006; Washington, DC. Abstract 5220.

Choudhary S, Chen Y, **Wang H-CR**. Ras-increased susceptibility of human cancer cells to histone deacetylase inhibitor. In: Proceedings of the American Association for Cancer Research Meeting; Apr. 2006; Washington, DC. Abstract 2443.

Siriwardhana NS, Chen Y, **Wang H-CR**. Substages in human breast cell carcinogenesis induced by NNK and B[a]P. Presented at: Genome Science & Technology Graduate Program Retreat; Feb. 2006; University of Tennessee/Oak Ridge National Laboratory, Knoxville, TN.

Choudhary S, Chen Y, **Wang H-CR**. Selective induction of apoptosis of oncogenic Ras-expressed human cancer cells by anticancer histone deacetylase inhibitors. Presented at: Genome Science & Technology Graduate Program Retreat; Feb. 2006; University of Tennessee/Oak Ridge National Laboratory, Knoxville, TN.

Xuemin Xu

Zhao G, Tan J, Mao G, Cui M-Z, **Xu X**. The same **γ**-secretase accounts for the multiple intramembrane cleavages of APP. *Journal of Neurochemistry*. In press.

Dong Y, Tan J, Cui M-Z, Zhao G, Mao G, Singh N, **Xu X**. Calpain inhibitor MDL28170 modulates Abeta formation by inhibiting the formation of intermediate Abeta46 and protecting Abeta from degradation. *Federation of American Societies of Experimental Biology Journal*. 2006;20:331-333.

Cui M-Z, Laag E, Zhao G, **Xu X**. Immediate early gene Egr-1 induction in response to lysophosphatidic acid in vascular smooth muscle cells. *Arteriosclerosis, Thrombosis, and Vascular Biology*. 2006;26:1029-1035.

Xu X. Molecular mechanism of γ-secretase mediated APP processing and Aβ formation. Presented at: Peking University; 2006; Beijing, China.

Research Funded Externally - Detail

Project Director	Title of Grant	Funding Agency	Project Period	Total Award	Expenditures
Baek, Seung Joon	Transcriptional Regulation and Biological Function of NAG-1	National Institutes of Health	09/08/03-06/30/06	$324,000	$106,432
	Anti-Cancer Effects by the Green Tea Catechins	National Institutes of Health	04/06/05-03/31/07	$337,331	$105,445
Brian, David	Mechanisms of coronavirus RNA amplification	National Institutes of Health	06/15/02-05/31/07	$1,735,219	$416,315
Cui, Mei-Zhen	Lysophosphatidic Acid and Tissue Factor in Atherosclerosis	National Institutes of Health	07/01/04-04/30/08	$1,002,400	$309,799
	Role of Lysophosphatidic Acid and Other Lipid Peroxidation Products in Smoking-Induced Atherothrombosis	Philip Morris, Inc.	07/01/04-06/30/07	$547,397	$210,122
	Lysophosphatidic Acid Induction of Tissue Factor Gene Expression in Vascular Smooth Muscle Cells	American Heart Association	07/01/03-06/30/06	$154,000	$10,669
Dhar, Madhu S.	Glucose Metabolism in a Novel Mouse Model of Obesity Associated with Insulin Resistance	American Heart Association	07/01/04-06/30/06	$110,000	$57,074
Frank, Nicholas	Evaluating the Effects of Endotoxin on Glucose Dynamics in Horses Using Intravenous Glucose Tolerance Test and Euglycemic Hyperinsulinemic Clamp Techniques	American Quarter Horse Association	10/01/05-09/30/06	$36,331	$31,655
	Effects of Long-Term Levothyroxine Sodium Administration on Glucose Dynamics and Health in Mares	Lloyd, Inc.	07/01/04-06/30/06	$20,580	$8,535
	Effects of Oral Levothyroxine on Body Weight, Percent Body Fat Mass, Insulin Sensitivity, and Adipose Gene Expression in Obese (Metabolic Syndrome) Horses	United States Equestrian Federation	07/01/04-06/30/06	$19,602	$13,139

Project Director	Title of Grant	Funding Agency	Project Period	Total Award	Expenditures
Kania, Stephen	Development of an Improved Test for Bovine Spongiform Encephalopathy Using Microchip Technology	MontVue Farms	08/03/04-02/01/06	$50,000	$7,221
Oliver, Stephen	Recurrent Coliform Mastitis in New York Dairy Cows	Cornell University	07/30/03-09/30/05	$99,922	$0
	Streptococcus uberis in Dairy Cows	Private	04/15/04-12/31/05	$240,052	$10,212
	SUAM: Streptococcus uberis Adhesion Molecule	Pfizer Animal Health	01/20/04-10/15/05	$15,050	$3,527
	Bovine Mastitis Research	Private	03/29/05-12/31/05	$130,500	$88,340
	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	$4,801
	Animal Health Innovation Award	Fort Dodge Animal Health Global Research	12/25/05-01/31/07	$234,646	$14,182
	Evaluation of Safety and Protection of Dairy Cows Experimentally Infected with E coli Following Administration of an E coli Vaccine During the Nonlactating Period	Epitopix, LLC	02/07/06-12/31/06	$86,468	$2,701
	Role of Streptococcus uberis Adhesion Molecule (SUAM) in the Pathogenesis of Bovine Mastitis	United States Department of Agriculture	06/01/04-07/31/07	$340,000	$83,180
	Mastitis Pathogen Adherence and Internalization	Private	12/05/05-12/31/06	$36,000	$0
Pighetti, Gina M.	Evaluating a Novel Gene Marker for its Association with Susceptibility to Mastitis	Private	08/24/04-02/28/06	$54,397	$16,273
	Developing a Multi-Site Haplotype Marker for Mastitis Susceptibility in Holstein Cattle	Private	08/31/05-08/31/06	$30,000	$17,511

Project Director	Title of Grant	Funding Agency	Project Period	Total Award	Expenditure
Plummer III, Howard K.	GIRK Channels, Beta-Adrenergic Signaling, and Breast Cancer	Philip Morris, Inc.	07/01/04-06/30/07	$752,989	$196,863
Rouse, Barry	Immunity Mechanisms in Herpesvirus Infections	National Institutes of Health	01/01/01-12/31/06	$1,656,250	$111,895
	Mechanisms in Herpetic Keratitis	National Institutes of Health	09/30/02-09/29/07	$1,779,700	$142,109
	T Regulatory Cells in HSV Immunity and Immunopathology	National Institutes of Health	02/01/06-01/31/11	$1,793,269	$340,437
Schuller, Hildegard	Transplacental Pancreatic Carcinogenesis by NNK	National Institutes of Health	05/01/03-04/30/07	$1,158,400	$273,557
	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	$165,692
	NNK, Beta-Adrenergic AA Release, and Lung Cancer	National Institutes of Health	04/01/02-03/31/07	$1,142,201	$200,982
	New Radiotracers for Targeting Mutated Protein for the Early Detection of Lung Cancer	Department of Energy	08/15/04-08/14/07	$181,135	$60,238
Schultz, T.W.	Biosurveillance, Agriculture and Environmental Security: A Coordinated, Innovative Approach	Department of Defense	12/01/04-11/30/06	$1,977,131	$273,414
	Bioluminescent Yeast-Reporter System for Screening Chemicals for Estrogenic and Androgenic Effects	Environmental Protection Agency	10/01/03-09/30/06	$11,499	$3,947
Small, Pamela	Mycolactone-Mediated Virulence in M. ulcerans	National Institutes of Health	01/01/01-02/28/06	$1,194,750	$176,502
	Investigations into the Role of Aquatic Reservoirs in the Transmission of Buruli Ulcer	World Health Organization	06/01/05-05/31/06	$35,800	$18,024
	Ecological Relationships of Mycobacterium ulcerans Infection	Michigan State University	09/26/05-06/30/10	$220,000	$34,928

Project Director	Title of Grant	Funding Agency	Project Period	Total Award	Expenditure
Tithof, Patricia	Alton Park/Piney Woods Environmental Health and Justice Collaborative	National Institutes of Health	10/01/04-09/30/08	$8,842	$2,210
Tobias, Karen M.	Comparison of 99m TcO4 Trans-splenic Portal Scintigraphy to Per-rectal Portal Scintigraphy for the Diagnosis of Portosystemic Shunts in Dogs	American Kennel Club Canine Health Foundation	07/01/05-06/30/06	$12,960	$10,930
Wang, Hwa-Chain Robert	Potency and Molecular Signatures of Tobacco Carcinogens in the Early Development of Human Breast Cancer	Philip Morris, Inc.	07/01/03-03/31/07	$633,326	$186,109
	Signaling Pathway in Modulation of Cell Quiescence	National Science Foundation	06/01/05-05/31/07	$100,000	$0
Xu, Xuemin	Role of a Novel Protein (PSAP) in Neurodegeneration	National Institutes of Health	09/01/01-08/31/06	$1,282,500	$146,225
	Determine the Role of the Long A_46 in Alzheimer Disease Development	Alzheimer's Association	10/01/05-09/30/08	$240,000	$62,325
Totals				**$20,666,950**	**$3,923,521**

Schedule 7

CENTERS OF EXCELLENCE/CENTERS OF EMPHASIS

ACTUAL, PROPOSED, AND REQUESTED BUDGET

Institution: College of Veterinary Medicine **Center: Livestock Diseases and Human Health**

	FY 2005-06 Actual			FY 2006-07 Proposed			FY 2007-08 Requested		
	Matching	**Appropr.**	**Total**	**Matching**	**Appropr.**	**Total**	**Matching**	**Appropr.**	**Total**
Expenditures									
Salaries									
Faculty	$28,873	$57,747	**$86,621**	$25,662	$51,324	**$76,987**	$26,945	$53,890	**$80,836**
Other Professional	$55,247	$110,495	**$165,743**	$56,431	$112,862	**$169,293**	$59,252	$118,505	**$177,757**
Clerical/ Supporting	$20,725	$41,451	**$62,177**	$3,364	$6,728	**$10,093**	$3,532	$7,065	**$10,597**
Assistantships	$22,702	$45,404	**$68,106**	$29,308	$58,616	**$87,924**	$30,773	$61,546	**$92,320**
Total Salaries	**$127,549**	**$255,098**	**$382,647**	**$114,765**	**$229,531**	**$344,297**	**$120,503**	**$241,007**	**$361,511**
Longevity	$836	$1,673	**$2,510**	$1,154	$2,309	**$3,464**	$1,212	$2,424	**$3,637**
Fringe Benefits	$30,581	$61,162	**$91,744**	$32,971	$65,943	**$98,915**	$34,620	$69,240	**$103,860**
Total Personnel	**$158,967**	**$317,934**	**$476,901**	**$148,892**	**$297,784**	**$446,676**	**$156,336**	**$312,673**	**$469,009**
Non-Personnel									
Travel	$1,787	$3,574	**$5,362**	$8,833	$17,666	**$26,500**	$9,275	$18,550	**$27,825**
Software	$833	$1,666	**$2,500**	$1,064	$2,128	**$3,193**	$1,117	$2,235	**$3,352**
Books & Journals	$0	$0	**$0**	$164	$329	**$494**	$172	$345	**$518**
Other Supplies	$36,539	$73,099	**$109,638**	$65,914	$131,828	**$197,743**	$29,824	$59,648	**$89,473**
Equipment	$17,299	$34,598	**$51,898**	$26,289	$52,579	**$78,869**	$27,604	$55,208	**$82,812**
Maintenance	$11,313	$22,627	**$33,941**	$12,514	$25,029	**$37,544**	$13,140	$26,280	**$39,421**
Scholarships	$6,322	$12,645	**$18,967**	$8,698	$17,397	**$26,096**	$9,133	$18,267	**$27,400**
Consultants	$0	$0	**$0**	$1,450	$2,900	**$4,350**	$1,522	$3,045	**$4,567**
Renovation	$0	$0	**$0**	$0	$0	**$0**	$0	$0	**$0**
Media / Communication	$121	$243	**$365**	$3,500	$7,000	**$10,500**	$3,675	$7,350	**$11,025**
Group Arranged Food and Lodging / Specialized Commercial Services / Seminar Confrence Registration	$839	$1,679	**$2,519**	$25,272	$50,544	**$75,817**	$26,535	$53,071	**$79607.85**
Other Services and Expenditures	$228	$456	**$685**	$0	$0		$0	$0	**$0**
Services	$4,295	$8,591	**$12,887**	$5,866	$11,732	**$17,599**	$6,159	$12,319	**$18,478**
Total Non-Personnel	**$79,580**	**$159,182**	**$238,762**	**$159,568**	**$319,136**	**$478,705**	**$128,161**	**$256,322**	**$384,483**
GRAND TOTAL	**$238,547**	**$477,116**	**$715,663**	**$308,460**	**$616,920**	**$925,381**	**$284,497**	**$568,995**	**$853,492**
Revenue									
New State Appropriation		$526,300	**$526,300**		$541,900	**$541,900**		$568,995	**$568,995**
Carryover State Appropriation		$25,837	**$25,837**		$75,021	**$75,021**			**$0**
New Matching Funds	$263,150		**$263,150**	$270,950		**$270,950**	$284,497		**$284,497**
Carryover from Previous Matching Funds	$12,908		**$12,908**	$37,510		**$37,510**			**$0**
Total Revenue	**$276,058**	**$552,137**	**$828,195**	**$308,460**	**$616,921**	**$925,381**	**$284,497**	**$568,995**	**$853,492**