Center of Excellence in Livestock Diseases and Human Health

2007 Annual Report

- Basic Research
- Models
- Cancer Therapy & Prevention
- Degenerative Diseases
- Nutrition & Metabolic Disorders
- Food Animal & Population Health
- Clinical Trials & Observations

The University of Tennessee College of Veterinary Medicine
Center of Excellence in Livestock Diseases and Human Health

Annual Report 2007

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College of Veterinary Medicine

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Message from the Center of Excellence

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

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

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

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

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

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

L-R: Misty Bailey, Michael J. Blackwell, and Robert N. Moore
## Comparative Summary of Accomplishments

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>2007 (18 faculty in center)</th>
<th>2006 (20 faculty in center)</th>
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<tr>
<td><strong>Publications</strong>&lt;sup&gt;*&lt;/sup&gt;</td>
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<tr>
<td>Peer-Reviewed Articles</td>
<td>62</td>
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<tr>
<td>Books or Book Chapters</td>
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<td>Abstracts or Posters</td>
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<td>24</td>
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<tr>
<td><strong>Presentations</strong>&lt;sup&gt;*&lt;/sup&gt;</td>
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<td>National</td>
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<td>State or Local</td>
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<tr>
<td><strong>Research Monies</strong>&lt;sup&gt;H&lt;/sup&gt;</td>
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<td>External Funding</td>
<td>$20,412,786</td>
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<tr>
<td>Research Expenditures</td>
<td>$3,430,059</td>
<td>$3,923,521</td>
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<tr>
<td>Return on Investment</td>
<td>6.3:1</td>
<td>7.5:1</td>
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</tbody>
</table>

* Based on calendar year through report publication date  
<sup>H</sup> Based on fiscal year
Dissemination of Research

Worldwide research dissemination via invited presentations

58 Presentations

62 Articles

42 Abstracts or Posters

11 Books & Chapters
The CVM distributes two publications to the public—the magazine Veterinary Vision and the newsletter Volunteer Vet—and one in-house newsletter, Discovery. Discovery won an Award for Publication Excellence (APEX) in 2007.

The annual magazine Veterinary Vision carries features concerning ongoing research activities and the results of concluded research studies. It is written for a general audience.

The quarterly newsletter Volunteer Vet features research activities and results and is distributed to donors and employees.

The quarterly, in-house newsletter Discovery keeps CVM researchers informed about each other’s work and research-related policies and resources. www.vet.utk.edu/research/newsletters/
The center was created in 1984 to promote interdisciplinary activities designed to improve the quality of human life through better animal health; expand livestock disease research capabilities in the College of Veterinary Medicine (CVM) and the Institute of Agriculture; identify and characterize animal diseases that are similar to human disease; and develop new strategies for the diagnosis, treatment, and prevention of disease.

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

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

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

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

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

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

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

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

<table>
<thead>
<tr>
<th>Investigator</th>
<th>Federal</th>
<th>Industry</th>
<th>Foundation/Private</th>
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* Represents total, all-years funding for active grants and contracts

### Research Expenditures FY 2007

<table>
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<tr>
<th>Investigator</th>
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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.

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

Start-Up Funding

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

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

Infrastructure

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

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

$80,935 helped fund equipment and service contracts

Allocation of Funding

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

- Scientific merit
- Potential to lead to extramural funding
- Relevance to the center’s objectives
Seminars and Sponsored Lectures

**Cheryl London**, “Kinase Dysfunction in Canine Cancer”  
Associate Professor of Veterinary Biosciences  
The Ohio State University College of Veterinary Medicine

**Microbiology Course Seminar Series**

**Stewart Cole**, “From Swamps to Schwann Cells: A Genomic Approach to Evolution of Pathogens”  
Director, Bacterial Molecular Genetics Unit  
Pasteur Institute

**Brigitte Gicquel**, “Host Pathogen Interactions During Infection by Mycobacterium tuberculosis”  
Director, Mycobacterial Genetics Unit  
Pasteur Institute

**John Gunn**, “Host Sensing and Bacterial Surface Modifications are Important for Salmonella in vivo Survival”  
Associate Professor of Molecular Virology, Immunology, and Medical Genetics  
Division of Infectious Diseases, The Ohio State University College of Medicine

**Vivek Kapur**, “Translational Research in Microbial Pathogenomics”  
Professor of Microbiology  
University of Minnesota

**Mercedes Pascual**, “Vibrio cholera”  
Associate Professor of Ecology and Evolutionary Biology  
University of Michigan

**Bala Swaminathan**, “Foodborne Disease Surveillance and Outbreak Investigations: Two Decades of Progress”  
Chief, Foodborne and Diarrheal Diseases Laboratory Section  
Centers for Disease Control

**John Timoney**, “The Pathogenesis of Strangles and the Origin and Biology of Streptococcus equi”  
Keeneland Chair in Equine Infectious Diseases, Gluck Equine Research Center  
University of Kentucky

**Comparative and Experimental Medicine Course Seminar Series**

**Dr. Steve Safe**, “Development of New Mechanism-Based Drugs for Cancer Chemotherapy”  
Distinguished Professor, CVM, Department of Veterinary Physiology and Pharmacology  
Texas A & M University

**Dr. Michael Wargovich**, “Chemoprevention of Colon Cancer By Anti-inflammatory Traditional Medicinal Plants”  
Professor and Director, Department of Pathology and Microbiology  
University of South Carolina

**Dr. Susan Fischer**, “COX-2 and Beyond — Critical Determinants for Skin Cancer Development”  
Professor, Department of Carcinogenesis  
University of Texas M.D. Anderson Cancer Center

**Dr. Chung S. Yang**, “Tea and Cancer Prevention: Molecular Mechanisms and Human Relevance”  
Professor, College of Pharmacy, Department of Chemical Biology  
Rutgers University
Dr. Carol A. Heckman, “Cancer Cell and Cytoskeleton”
Director, Center for Microscopy and Microanalysis, and Professor of Biological Sciences
Bowling Green State University

Dr. Patrick Stover, “Folic Acid, Cancer and Birth Defects: Managing Genome Stability and Expression”
Professor & Division Director, College of Human Ecology
Cornell University

Dr. Gary Stoner, “Prevention of Gastrointestinal Tract Cancers with Berries and Berry Components”
Distinguished Professor
Ohio State University

Dr. Rong-Fong Shen, “Proteomics in Biomedical Science”
Director, Proteomics Core Facility
National Heart Lung and Blood Institute, NIH

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

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

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

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

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

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

A graduate of the University of Connecticut with a B.S. degree in animal science and pathobiology, Lora Abbott studied under the direction of Dr. Frank Andrews. Lora, a third-year student from Knoxville, studied the causes of gastric ulcer diseases in horses. She used an Ussing chamber and real-time polymerase chain reaction to study the effect of volatile fatty acid concentration on acid injury in the non-glandular equine stomach. After graduating, Lora hopes to practice equine medicine and eventually turn to academic teaching and research.
Jennifer Bernard is a second-year student from Germantown, and she attended nearby Christian Brothers University in Memphis, where she earned a B.S. in biology with a minor in chemistry. This summer, Jennifer assisted Dr. Melissa Kennedy in using real-time polymerase chain reaction and indirect fluorescent immunoassays to look at the prevalence and epidemiology of feline coronavirus infections in captive and free-ranging cheetahs in South Africa. She did this work at the University of Pretoria in South Africa. Ultimately, Jennifer would like to work in zoo medicine, virology, and infectious/zoonotic diseases.

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

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

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

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

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

A graduate of the University of Tennessee with a B.S. in biology, Lauren Hiatt is a Chattanooga native. This second-year student worked with Dr. Stephen Kania this summer to develop a polymerase chain reaction test that can distinguish between the three major Staphylococcal species in veterinary medicine: S. aureus, S. intermedius, and S. schleiferi. Lauren is interested in a future in veterinary public health or laboratory animal medicine.
Carolyn Elise Jones, a second-year student from Nashville, earned a B.S. in animal science with a minor in biology from the University of Tennessee. Dr. Charles Faulkner served as her mentor for a study of internal parasites in passerine birds in the Great Smoky Mountain National Park. She gained valuable skills such as laboratory diagnostic procedures, bird and parasite identification, microscopy techniques, microscopic photography, bird handling, and data management. Upon graduation, Elise wants to develop a large animal private practice.

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

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

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

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

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

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

With a B.A. degree in biology from The Colorado College in Colorado Springs is second-year student Ashley Portmann. Ashley is a native of Knoxville, and she worked with Dr. Sarel Van Amstel on her COE llama project. Her research involved evaluating ivermectin (an anti-parasitic medication) levels in the blood and cerebrospinal fluid of llamas after injection. She did literature searches, data collection, and presentation of the work. After graduation, Ashley wants to establish herself in small ruminant medicine or small animal medicine.
Karen-Anjali Pye Sanon is a second-year student from Knoxville. She earned a B.A. in social science and studio art from Fordham University in New York, but she also studied in the pre-medicine program there. Dr. Dave Rotstein was Anjali’s mentor this summer in writing a paper for publication in the Journal of Wildlife Diseases. The paper’s topic is a cetacean stranding that occurred in 2005. This stranding was a unique event that allowed them to explore not only possible causes of the stranding, but also to compile data for a broader database to be used for comparison purposes and to give more detailed information on the species. Anjali’s career interests lie in global wildlife conservation.

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

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

Benjamin Young, second-year student from Knoxville, earned a B.A. from St. John’s College, where he majored in philosophy and minored in the history of mathematics. Ben worked with Dr. Joe Bartges this summer to investigate the effects of a commonly-prescribed supplement on the risk of calcium oxalate stone formation in cats. He evaluated the changes in urine electrolytes and minerals, urinary excretion of calcium oxalate, and glycosaminoglycan levels. Benjamin’s interest lies in small animal medicine, but his research experience this summer has piqued an interest in a career in research and academia.
Productivity among center faculty has been outstanding during the last five-year period. From 2003-2007, center faculty published 455 articles in peer-reviewed journals and gave 237 invited presentations at national and international meetings. In addition, total external funding increased from approximately $16.7 million in 2003 to $20.4 million in 2007. Funding from industry, foundations, and other private sources increased from approximately $2.3 million in 2003 to $4.1 million in 2007. Furthermore, research expenditures increased from $3.1 million in 2003 to $3.4 million in 2007. The five-year average return on the state’s investment in the center is 6.9:1, the ratio of research expenditures to the state’s appropriation. For comparison, benchmark data from 2003-2007 are summarized in Figs. 2-4.
Future Plans

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

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

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

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

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

Fig. 5 CVM research strategic plan
Nonsteroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen and aspirin, are well known for treating inflammatory diseases like arthritis. These NSAIDs work by inhibiting cyclooxygenase (COX), an enzyme known to cause inflammation and pain. Less known, and the focus of Dr. Baek’s studies, is the effect NSAIDs have on the development of human colorectal and other cancers.

Dr. Baek’s research team has preliminary evidence that NSAIDs work to prevent cancer not by inhibiting COX, but by inducing the expression of a gene in the body that may cause cancer cell death. The effect of this gene (NAG-1 [nonsteroidal anti-inflammatory drug activated gene]) on cancer cell death and how the gene responds to NSAIDs to initiate cell death comprise Dr. Baek’s research. Specifically, his laboratory is investigating the NSAID sulindac sulfide and its ability to induce gene expression.

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

The results of Dr. Baek’s research may lead to the development of a new family of anti-cancer drugs.
Mei-Zhen Cui
Associate Professor
Pathobiology Department
PhD, Tokyo Institute of Technology, Japan

Two refereed publications in 2007

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

The Role of Lysophosphatidic Acid in Atherosclerosis

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

An early growth receptor gene (Egr-1) plays a key role in vascular injury, and Dr. Cui has found, via in vitro studies, that lysophosphatidic acid (LPA) likely affects Egr-1 expression. Although LPA’s role in atherosclerosis is unclear, it is one known substance that comprises the plaques that accumulate on the inner-most layer of the artery wall. Dr. Cui’s laboratory recently discovered that LPA markedly increases Egr-1 gene expression in the cells that make up the middle layer of the artery wall.

During the past year, Dr. Cui has studied LPA’s effect on Egr-1 using in vivo techniques in a mouse model. Her research may lead to the identification of new therapeutic targets to prevent and cure vascular diseases.
Approximately 65% of adults in the United States are obese. Most Americans recognize obesity as a contributor to heart disease and insulin resistance, which coincides with diabetes. However, obesity is less known to also be related to cancer.

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

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

The long-term goal of this investigation is to identify new molecular targets that may eventually be used in cancer prevention, therapeutics, or diagnostics.
Physicians often warn their human patients about the possibility of creating drug-resistant strains of bacteria by failing to complete full treatment of an infection with antibiotics. However, mutant strains of bacteria evolve in both humans and animals, and some forms of bacteria are shared between the two.

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

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

This work could help identify the most effective treatments for staphylococci infections and influence decisions regarding the need for treatment in certain cases. The important information these studies will provide will also prove useful to investigations into staphylococci affecting humans.
Howard K. Plummer, III
Research Assistant Professor
Pathobiology Department
PhD, Bowling Green State University

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

Intervention of Small Cell Lung Cancer

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

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

Dr. Plummer expects to find that the combined effect of GIRK1 and its regulating receptor inhibits the formation and/or progression of SCLC. Knowledge from this study could then be used to develop new therapies to treat SCLC since a component of tobacco initiates cancerous progress via this receptor.
Hildegard Schuller
Distinguished Professor
Pathobiology Department
DVM, Justus Liebig University, Germany
Five refereed publications in 2007

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

Regulatory Mechanisms in Lung Cancer

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

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

In her laboratory, Dr. Schuller has determined that many of nicotine’s biological effects may be caused by the interaction of nitrosamines (like NNK) with nAChRs. Likewise, other factors in the human environment, such as diet and use of certain cosmetics and medicines, may also heighten the sensitivity of nAChRs, thus increasing the possibility of lung cancer.

Still, a host of factors in the human environment affects the sensitivity of these receptors, making it important to develop tools to identify hyperstimulation in individual patients. Dr. Schuller’s research can be used to help design lung cancer prevention and treatment strategies based on that hyperstimulation.
Hwa-Chain Robert Wang
Associate Professor
Pathobiology Department

BVM, National Chung-Hsing University, Taiwan
PhD, University of Virginia
Three refereed publications in 2007

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

Cell Death Regulation in Cancer Prevention

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

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

The focus of Dr. Wang’s research is to determine the mechanisms that promote or support cancer cell survivability in these conditions. The results from this study could lead to new therapies for cancer prevention or treatment.
Xuemin Xu
Professor
Pathobiology Department
PhD, Tokyo Institute of Technology, Japan
Two refereed publications in 2007

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

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

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

The accumulation of amyloid plaques in the brain is believed to be a causative event in Alzheimer’s disease. These plaques are composed of small clusters of β-amyloid peptides (Aβ), which link to form proteins. Specifically, Aβ is part of a large amyloid precursor protein (APP). The Aβ species are organized by scientists by their total number of amino acids. Most Aβ peptides identified so far end at amino acids 40 or 42, but Dr. Xu’s research team discovered an Aβ46 and an Aβ49.

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

The discovery of these two species provides a new opportunity for drug development targeting these peptides as well as the enzymes β-secretase and γ-secretase.
According to the latest USDA survey, Tennessee ranks second in the U.S. in equine ownership, a total value of approximately $565 million. Gastric ulcers in horses result in abdominal pain, weight loss, and poor performance, causing economic loss to the industry, particularly in race horses.

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

The focus of Dr. Andrews’ research is two-fold. First, he seeks to determine the combined effect of volatile fatty acids and lactic acid together with hydrogen chloride. Then, he plans to investigate calcium as a protective agent.

These two research aims may help clarify, first, why some horses are resistant to treatment with medication, and second, how diet contributes to ulcers in horses. With this information, Dr. Andrews’ investigative team hopes to work with feed companies and nutritionists to formulate diets and supplements that produce lower acid concentrations in the stomach.
Bovine coronavirus (BCV) has a high incidence rate among cattle, especially dairy cows, in which it can cause decreased milk production and weight loss. In adult cows, the disease is marked by intestinal problems, while calves usually experience respiratory disease.

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

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

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

The viral group to which BCV belongs also includes the human-type severe acute respiratory syndrome (SARS). Therefore, research on BCV could also lead to breakthroughs in SARS treatment.
A viral infection affecting wildlife in Tennessee may be more widespread than first thought. This virus, malignant catarrhal fever (MCF), poses a potential endemic threat to the animal agriculture industry and affects four known species: cattle, sheep, goats, and deer.

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

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

Dr. Donnell seeks to determine the distribution and prevalence of MCF throughout the state. His research team spent the last year collecting samples and educating producers, managers, and policymakers within Tennessee about the disease risks.
Nicholas Frank  
Associate Professor  
Large Animal Clinical Sciences Department  
DVM, PhD, Purdue University  
Eight refereed publications in 2007

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

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

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

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

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

His research could have a huge economic impact on the Tennessee horse industry, which was worth about $565 million in 2004.
When abnormal proteins deposit within the body, a condition called amyloidosis occurs. Amyloidosis is responsible for multiple myeloma (a form of cancer), Alzheimer’s disease, and type II diabetes in humans.

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

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

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

In addition, validating a canine model may have far reaching implications for the treatment of other amyloid-associated disorders in humans.
Stephen Oliver
Professor
Animal Science Department
PhD, The Ohio State University
Nine refereed publications in 2007

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

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

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

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

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

Inhibiting Mastitis by Targeting Epitopes of SUAM
Gina M. Pighetti
Associate Professor
Animal Science Department
PhD, Pennsylvania State University
One refereed publication in 2007

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

A Telling DNA Marker to Predict Mastitis Susceptibility

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

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

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

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

Using this information, novel preventive or therapeutic agents could be developed to modify neutrophil functions and subsequently enhance disease resistance and reduce disease severity. Food safety would be enhanced by improving overall milk quality and reducing the use of antimicrobials.
Natural killer (NK) cells have been shown to fight against many infections, thereby partially determining an infection’s outcome and influencing subsequent immune response to that infection.

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

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

Dr. Rouse hypothesizes that the interaction of HSV and its current vaccine formulations with the NK cell system affects other infection-fighting cell responses.
Classifying Xenobiotics Based on Their Biological Activity

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

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

To better predict the body’s reaction to chemicals, Dr. Schultz has been developing tests to identify molecular initiating events. His research involves grouping toxics not by conventional chemical class, but rather by how they interact and react with proteins found in the body.

Eventually, all this information will be compiled in a toxicity database and made available to experts in the field. One way this database will eventually be used is to provide accurate information for those in the chemical industry to assist them in assessing the potential harmfulness of their products.
Karen M. Tobias
Professor
Small Animal Clinical Sciences Department
DVM, University of Illinois
MS, The Ohio State University
Four refereed publications in 2007

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

Using an Ameroid Constrictor to Control Liver Shunts

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

Scintigraphy, a nuclear video scan that measures blood flow, is usually used to initially diagnose shunts. To correct the problem, an ameroid constric tor 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 constric tor and consequently cutting off (occluding) blood flow through the shunt. Dr. Tobias’s research group is working to develop a new type of occlusion procedure and has studied cellophane banding of the shunt, as well as inserting coils to close it.

Ameroid constrictors are also being used in medical research applicable to humans. These constrictors have proven useful during angiogenesis, a process involving the growth of new blood vessels, and may provide relief for angina.
Frank M. Andrews (p. 26)


Andrews FM. Colic in the horse, when to refer. Invited lecture presented for: Bain Fallon Memorial Lectures; Jul. 2007; Fremantle, West Australia.


Seung Joon Baek (p. 18)


Lee SH, Cekanova M, Baek SJ. Multiple mechanisms are involved in 6-gingerol-induced cell cycle arrest and apoptosis in human colorectal cancer cells. Molecular Carcinogenesis. In press.


David Brian (p. 27)


Mei-Zhen Cui (p. 19)


Madhu Dhar (p. 20)

Dhar M, Hance M, Plummer HK. Tobacco carcinogens stimulate G-protein inwardly rectifying potassium channel 1 (GIRK1) protein expression in a small cell lung cancer cell line. Poster presented at: Ion Channel Targets Conference; Sept. 2007; Boston, MA.


Hance MW, Dhar MS, Plummer III HK. Effects of G-protein inwardly rectifying potassium channel 1 (GIRK1) knockdown in the MDA-MB453 breast cancer cell line. Poster presented at: Beyond Genome Conference; Jun. 2007; San Francisco, CA.


Robert L. Donnell (p. 28)


Nicholas Frank (p. 29)


Frank N. Obesity, laminitis, and insulin resistance. Lecture presented at: Equine Nutrition Conference; Jul. 2007; Vienna, Austria.

Frank N. Equine metabolic syndrome. Lecture presented at: Equine Nutrition Conference; Jul. 2007; Vienna, Austria.

Frank N. Equine metabolic syndrome and endocrinopathic laminitis. Lecture presented at: Upper Cumberland Academy of Veterinary Medicine; Jun. 2007; Gallatin, TN.

Frank N. Management of equine metabolic syndrome. Lecture presented at: Upper Cumberland Academy of Veterinary Medicine; Jun. 2007; Gallatin, TN.

Frank N. Pituitary pars intermedia dysfunction. Lecture presented at: Upper Cumberland Academy of Veterinary Medicine; Jun. 2007; Gallatin, TN.

Frank N. Equine medicine updates. Lecture presented at: Upper Cumberland Academy of Veterinary Medicine; Jun. 2007; Gallatin, TN.

Frank N. Diagnosis of equine metabolic syndrome. Lecture presented at: American College of Veterinary Internal Medicine 25th Annual Forum; Jun. 2007; Seattle, WA.

Frank N. Management of equine metabolic syndrome. Lecture presented at: American College of Veterinary Internal Medicine 25th Annual Forum; Jun. 2007; Seattle, WA.

Frank N. Current thoughts on the pathophysiology of laminitis associated with insulin resistance. Lecture presented at: Havemeyer Equine Laminitis Workshop; May 2007; Litchfield, SC.

Frank N. Pituitary pars intermedia dysfunction. Lecture presented at: University of Tennessee College of Veterinary Medicine Annual Conference; Feb. 2007; Knoxville, TN.

Frank N. Equine metabolic syndrome. Lecture presented at: University of Tennessee College of Veterinary Medicine Annual Conference; Feb. 2007; Knoxville, TN.


Tóth F, Frank N, Elliott SB, Geor RJ and Boston RC. Effects of an intravenous endotoxin challenge on glucose and insulin dynamics in mares. Abstract presented at: Havemeyer Equine Laminitis Workshop; May 2007; Litchfield, SC.

Stephen Kania (p. 21)


Bemis DA, Kania SA. Isolation of a bartonella sp. from sheep blood. Emerging Infectious Diseases. In press.


Kania SA. Oncology, flow cytometry- oncology applications. Lecture presented at: University of Tennessee College of Veterinary Medicine Resident Seminar Series; 2007; Knoxville, TN.

Al-Ahmad H, Kania SA, Trent DJ, Stewart, Jr CN. Determination of plant nuclear DNA content by flow cytometry. Poster presented at: American Society of Plant Biologists, Plant Biology and Botany Joint Congress 2007; Jul. 2007; Chicago, IL.


Claudia A. Kirk (p. 30)


LeBlanc A, Cox S, Kirk CA, Newman S, Bartges JM, Legendre A. Effects of L-asparaginase on plasma amino acid profiles

Chapman A, Kirk CA, Patton S. Centipede (class Chilopoda) envenomation in a hypersensitive dog. Poster presented at: Joint Meeting of the 51st Livestock Insect Workers’ Conference and the 9th Biennial International Symposium of Ectoparasites of Pets; Jun. 2007; Lexington, KY.

Kirk CA. Expert witness. US Senate Pet Food Panel; April 2007; Washington, D.C.


Kirk CA. Clinical response to a novel appetite suppressant (Dirlotapide) for treatment of canine obesity. Lecture presented at: American College of Veterinary Internal Medicine Forum; Jun. 2007; Seattle, WA.

Kirk CA. Dirlotapide use. Lecture presented at: Pfizer European Meeting; May 2007; Milan, Italy.

Kirk CA. Dirlotapide study. Lecture presented at: Pfizer US Meeting; Apr. 2007; Salt Lake City, UT.

Kirk CA. Salt and stress in lower urinary tract disease. Lecture presented at: Western Veterinary Conference; Feb. 2007; Las Vegas, NV.


Kirk CA. Managing those difficult feline cases. Lecture presented at: North American Veterinary Conference; Jan. 2007; Orlando, FL.


Stephen Oliver (p. 31)


Luther DA, Almeida RA, Oliver SP. Elucidation of the DNA and amino acid sequence of Streptococcus uberis Adhesion Molecule. Veterinary Microbiology. In press.


Oliver SP. Pathogens that cause mastitis in heifers and their sources. Invited seminar presented at: International Conference on Heifer Mastitis; Jun. 2007; Ghent, Belgium.

Oliver SP. Nonantibiotic strategies for inhibiting veterinary and foodborne pathogens. Invited seminar presented at: DeLaval; Mar. 2007; Kansas City, MO.


Oliver SP. Tennessee quality milk initiative. Lecture presented at: Dairy Future Conference, Dairy Research and Education Center; Jun. 2007; Lewisburg, TN.

Oliver SP. Mastitis pathogens. Lecture presented at: Tennessee Quality Milk Initiative Extension In-Service Training Session; May 2007; Sweetwater, TN.

Oliver SP. Strategies for the prevention and control of mastitis. Lecture presented at: Tennessee Quality Milk Initiative Extension In-Service Training Session; May 2007; Sweetwater, TN.

Oliver SP. Mastitis pathogens. Lecture presented at: Tennessee Quality Milk Initiative Extension In-Service Training Session; May 2007; Spring Hill, TN.

Oliver SP. Strategies for the prevention and control of mastitis. Lecture presented at: Tennessee Quality Milk Initiative Extension In-Service Training Session; May 2007; Spring Hill, TN.

Oliver SP. Comprehensive analysis of bulk tank milk quality of Tennessee dairy farms. Lecture presented at: University of Florida Southeast Milk Dairy Check-Off Program; Apr. 2007; Gainesville, FL.

Gina M. Pighetti (p. 32)


Howard Plummer, III (p. 22)

Dhar M, Hance M, Plummer HK. Tobacco carcinogens stimulate G-protein inwardly rectifying potassium channel 1 (GIRK1) protein expression in a small cell lung cancer cell line. Poster presented at: Ion Channel Targets Conference; Sept. 2007; Boston, MA.

Hance MW, Dhar MS, Plummer III HK. Effects of G-protein inwardly rectifying potassium channel 1 (GIRK1) knockdown in the MDA-MB453 breast cancer cell line. Poster presented at: Beyond Genome Conference; Jun. 2007; San Francisco, CA.

Barry Rouse (p. 33)


Rouse B. Invited speaker to lecture at: Korean Association of Immunologists Meeting; Nov. 2007.

Rouse B. Molecular mimicry and beyond. Invited lecture to be presented at: Symposium on Infectious Disease; Oct. 2007; Rotterdam, Holland.

Rouse B. Immunology section chairman. Presented at: International Herpesvirus Workshop; Jul. 2007; Asheville, N.C.

Hildegard Schuller (p. 23)


Schuller HM. Nitrosamines as nicotinic receptor ligands. Life Sciences. 2007;80:2274-2280.

T.W. Schultz (p. 34)


Schultz TW. GSH RC50 values: Relationships to other measurements of reactivity and sensitization. Lecture presented at: European Centre for the Validation of Alternative Methods Workshop on Chemical Reactivity in Predicting Skin Sensitization; May 2007; Ispra, Italy.


Karen M. Tobias (p. 35)


Tobias KM. Postoperative management and complications after extensive gastrectomy in two dogs. Lecture presented at: Society of Veterinary Soft Tissue Surgery Annual Meeting; Jun. 2007; Breckenridge, CO.

Tobias KM. When radiologists and surgeons disagree. Lecture presented at: Society of Veterinary Soft Tissue Surgery Annual Meeting; Jun. 2007; Breckenridge, CO.
Tobias KM. Palate repairs. Lecture presented at: Society of Veterinary Soft Tissue Surgery Annual Meeting; Jun. 2007; Breckenridge, CO.

Tobias KM. Challenging ear cases: An interactive presentation. Lecture presented at: British Small Animal Veterinary Association Congress; Apr. 2007; Birmingham, UK.

Tobias KM. Radiology versus surgery: When results conflict. Lecture presented at: European Association of Veterinary Diagnostic Imaging Satellite Meeting, British and Irish Division; Apr. 2007; Birmingham, UK.

Tobias KM. Advances in portosystemic shunt diagnosis. Lecture presented at: European Association of Veterinary Diagnostic Imaging Satellite Meeting, British and Irish Division; Apr. 2007; Birmingham, UK.

Tobias KM. Nongastric GI surgery emergencies. Lecture presented at: University of Pennsylvania School of Veterinary Medicine Penn Annual Conference; Mar. 2007; Philadelphia, PA.

Tobias KM. Urinary surgery emergencies. Lecture presented at: University of Pennsylvania School of Veterinary Medicine Penn Annual Conference; Mar. 2007; Philadelphia, PA.

Tobias KM. Emergency management of portosystemic shunt patients. Lecture presented at: University of Pennsylvania School of Veterinary Medicine Penn Annual Conference; Mar. 2007; Philadelphia, PA.

Tobias KM. Surgical management of portosystemic shunt patients. Lecture presented at: University of Pennsylvania School of Veterinary Medicine Penn Annual Conference; Mar. 2007; Philadelphia, PA.

Tobias KM. Lunch with the experts: Emergency surgery. Lecture presented at: University of Pennsylvania School of Veterinary Medicine Penn Annual Conference; Mar. 2007; Philadelphia, PA.

Tobias KM. Updates on surgery. Lecture presented at: University of Tennessee College of Veterinary Medicine Annual Conference; Feb. 2007; Knoxville, TN.


**Publications and Presentations**

**Tobias KM.** Respiration and circulation. Lecture presented at: Nature’s Way Montessori Middle School; Feb. 2007; Knoxville, TN.

**Hwa-Chain Robert Wang** (p. 24)

Choudhary S, **Wang H-CR.** Pro-apoptotic ability of oncogenic H-Ras to facilitate apoptosis induced by histone deacetylase inhibitors in human cancer cells. Molecular Cancer Therapeutics. 2007;6:1099-1111.


**Wang H-CR.** Education in American veterinary colleges. Lecture presented at: Huazhong Agricultural University College of Veterinary Medicine and College of Animal Science and Technology; May 2007; Wuhan, China.

**Wang H-CR.** Education in American veterinary colleges. Lecture presented at: Beijing University of Agriculture Department of Animal Husbandry and Veterinary Medicine; May 2007; Beijing, China.

**Wang H-CR.** Education in American veterinary colleges. Lecture presented at: Beijing Agricultural Technology College Department of Animal Science and Veterinary Medicine; May 2007; Beijing, China.

**Wang H-CR.** Proapoptotic Ras for therapeutics, prevention of breast cell carcinogenesis, and natural canine cancers. Lecture presented at: National Health Research Institutes; May 2007; Miaoli, Taiwan.

**Wang H-CR.** Proapoptotic Ras for therapeutics and natural canine cancers. Lecture presented at: Chang Gung Memorial Hospital; May 2007; TaoYuan, Taiwan.

**Wang H-CR.** Proapoptotic ability of Ras oncogene to enhance the anticancer activity of histone deacetylase inhibitors. Lecture presented at: Taipei Veterans General Hospital Medical Research Institute; May 2007; Taipei, Taiwan.


Choudhary S, **Wang H-CR.** Pro-apoptotic ability of oncogenic H-Ras to facilitate apoptosis induced by histone deacetylase inhibitors. Poster presented at: University of Tennessee/Oak Ridge National Laboratory Genome Science & Technology Graduate Program Retreat; Mar. 2007; Knoxville, TN. Abstract 34.

**Xuemin Xu** (p. 25)


<table>
<thead>
<tr>
<th>Investigator</th>
<th>Project Title</th>
<th>Funding Agency</th>
<th>Project Period</th>
<th>Total Award</th>
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<td>Andrews, Frank</td>
<td>Validation of the use of a capsule for measurement of transit time, pH, temperature and luminal pressure in the gastrointestinal tract of horses</td>
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<td>The efficacy of Seabuckthorn Liquid Supplement in prevention of gastric ulcers in horses</td>
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<td>Effects of SmartControl IR on insulin sensitivity in obese insulin-resistant horses</td>
<td>SmartPak Equine</td>
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<td>Molecular pathways that mediate genetic susceptibility to low dose ionizing radiation</td>
<td>UT-Battelle–Oak Ridge National Laboratory</td>
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<td>Evaluation of neutrophil function in treated tumor-bearing dogs</td>
<td>American Kennel Club Canine Health Foundation</td>
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<td>Kirk, Claudia</td>
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<td>Kirk, Claudia</td>
<td>Urinary markers of feline idiopathic cystitis (FIC) multi-center trial</td>
<td>Hill’s Pet Nutrition</td>
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<td>Activity product ratios and calcium oxalate urolith risk in cats with chronic renal disease</td>
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<td>Characterize the hormone adiponectin in felids by determining cDNA sequence, mRNA expression, and molecular weight composition</td>
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<td>Pfizer Animal Health</td>
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<td>Dosing and duration of an intramammary treatment of experimentally-induced Streptococcus uberis mastitis in lactating dairy cattle</td>
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<td>Role of <em>Streptococcus uberis</em> adhesion molecule (SUAM) in the pathogenesis of bovine mastitis</td>
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<td>The effect of physiologic dexamethasone on blood glucose level in dogs following congenital portosystemic shunt ligation</td>
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<td>$1,486,250</td>
<td>$55,233</td>
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<td></td>
<td>Determine the role of the long Abeta-46 in AD development</td>
<td>Alzheimer’s Association</td>
<td>10/01/05-09/30/08</td>
<td>$240,000</td>
<td>$72,074</td>
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* New account
§ No-cost extension
<table>
<thead>
<tr>
<th></th>
<th>FY 2006-07 Actual</th>
<th>FY 2007-08 Proposed</th>
<th>FY 2008-09 Requested</th>
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<tbody>
<tr>
<td><strong>Expenditures</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matching</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Salaries</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty</td>
<td>25,903</td>
<td>51,805</td>
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<tr>
<td>Other Professional</td>
<td>60,456</td>
<td>120,911</td>
<td>181,367</td>
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<tr>
<td>Clerical/ Supporting</td>
<td>22,370</td>
<td>44,741</td>
<td>67,111</td>
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<tr>
<td>Assistships</td>
<td>31,271</td>
<td>62,541</td>
<td>93,812</td>
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<tr>
<td>Total Salaries</td>
<td>139,999</td>
<td>279,999</td>
<td>419,998</td>
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<tr>
<td>Longevity</td>
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<td>1,790</td>
<td>2,685</td>
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<tr>
<td>Fringe Benefits</td>
<td>32,860</td>
<td>65,720</td>
<td>98,580</td>
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<tr>
<td>Total Personnel</td>
<td>173,754</td>
<td>347,509</td>
<td>521,263</td>
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<tr>
<td><strong>Non-Personnel</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Travel</td>
<td>5,955</td>
<td>11,909</td>
<td>17,864</td>
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<tr>
<td>Software</td>
<td>240</td>
<td>480</td>
<td>720</td>
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<td>Books &amp; Journals</td>
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<td>433</td>
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<tr>
<td>Other Supplies</td>
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<td>132,992</td>
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<td>Renovation</td>
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<tr>
<td>Rentals</td>
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<td>88</td>
<td>132</td>
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<tr>
<td>Media / Communication</td>
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<td>1,631</td>
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<tr>
<td>Group Arranged Food &amp; Lodging / Specialized Commercial Services / Seminar Conference Registration</td>
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<td>7,057</td>
<td>10,585</td>
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<tr>
<td><strong>Total Non-Personnel</strong></td>
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<tr>
<td><strong>GRAND TOTAL</strong></td>
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<td>574,499</td>
<td>861,769</td>
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<td><strong>Revenue</strong></td>
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<tr>
<td>New State Appropriation</td>
<td>546,300</td>
<td>546,300</td>
<td>556,600</td>
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<tr>
<td>Carryover State Appropriation</td>
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<td>75,021</td>
<td>46,822</td>
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<td>New Matching Funds</td>
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<td>273,150</td>
<td>278,300</td>
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<td>Carryover from Previous Matching Funds</td>
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<td>37,510</td>
<td>23,390</td>
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<tr>
<td><strong>Total Revenue</strong></td>
<td>310,660</td>
<td>621,321</td>
<td>931,981</td>
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