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## OUR MISSION

- 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 (UTCVM) and the Institute of Agriculture
- Identify and characterize animal diseases that are similar to human diseases
- Develop new strategies for the diagnosis, treatment, and prevention of disease

## ADMINISTRATION

This report is produced by the University of Tennessee, College of Veterinary Medicine, Office of the Associate Dean for Research, 2407 River Dr, Rm A102, Knoxville, TN 37996-4550

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Dr. Jim Thompson

### **Chancellor, Institute of Agriculture**

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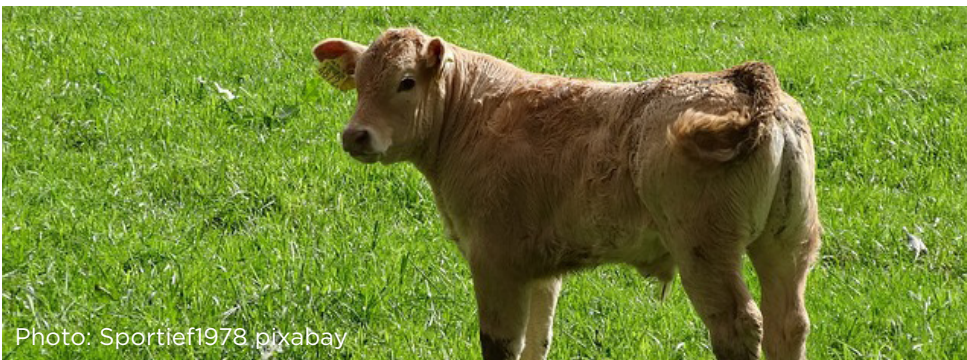


Photo: Sportief1978 pixabay

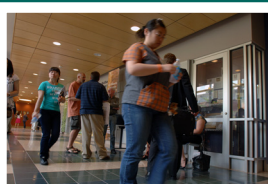


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## LETTER FROM THE DEAN

We are pleased to present the 2014 annual report for the Center of Excellence in Livestock Diseases and Human Health.

Within this report, you will see highlights of 15 faculty research projects funded by the center in fiscal year 2014. These faculty have made significant advancements in cancer biology, molecular pathophysiology, host defense, and disease transmission. Center faculty also made significant advancements in the prevention and treatment of infectious and non-infectious livestock diseases that affect agricultural productivity.

Benchmark data are also included for fiscal years 2010–2014. Research funding steadied, and the return on investment, as the ratio of research expenditures to the state appropriation for the center, was 4.5:1.

Center faculty continue to garner national and international recognition for their research and scholarship. During calendar year 2013, center faculty published 51 peer-reviewed articles and gave 102 presentations at regional, national, and international meetings.

Despite increased fiscal challenges faced by our center faculty, we are extremely proud of their efforts and continued success; we hope you enjoy this summary presentation of center activities and accomplishments.

Dr. Jim Thompson

**Dean, UT College of Veterinary Medicine**

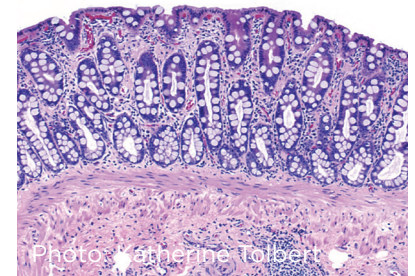


# COMPARATIVE SUMMARY OF ACCOMPLISHMENTS

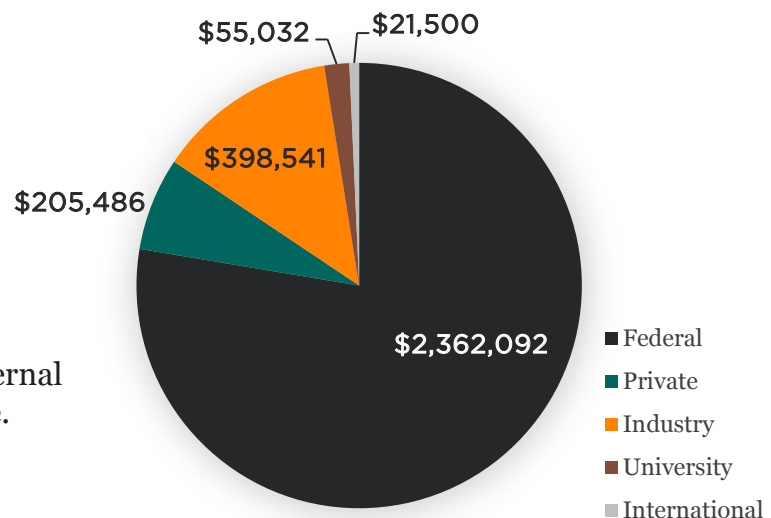
Benchmark	2014 (15 faculty) n (mean)*	2013 (12 faculty) n (mean)†
<b>Publications</b>		
Peer-reviewed articles	51 (3.4)	51 (4.25)
Books or book chapters	0 (0)	0 (0)
Abstracts or posters	63 (4.2)	41 (3.42)
<b>Presentations</b>		
International	21 (1.4)	30 (2.5)
National	42 (2.8)	10 (0.83)
State or local	39 (2.6)	5 (0.42)
<b>Research monies</b>		
External funding	\$3,042,651 (\$202,843)	\$1,746,627 (\$145,552)
Research expenditures	\$2,360,916 (\$157,394)	\$2,057,499 (\$171,458)
Return on investment	4.5:1	4.1:1

\*Publication and presentation numbers based on 2013 calendar year; research monies based on 2014 fiscal year.

†Publication and presentation numbers based on 2012 calendar year; research monies based on 2013 fiscal year.

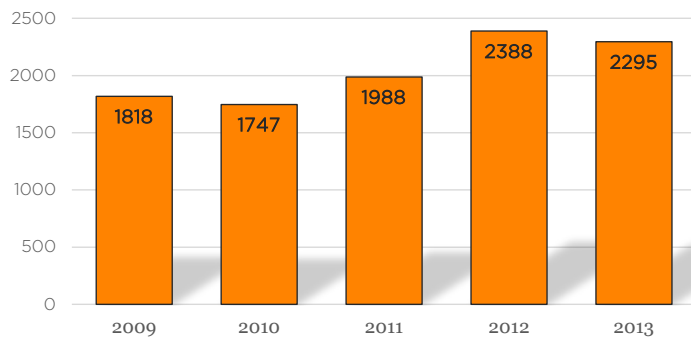


**Fig. 1.** FY 14 external funding by source.





Despite the persisting, sluggish funding environment, 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 (p. 24–37).



**Fig. 2.** Number of times publications by 2014 center faculty were cited by others from calendar years 2009 to 2013 (Scopus citation index).

## ACCOMPLISHMENTS

The return on the state’s investment in the center was 4.5:1, calculated as a ratio of expenditures from extramural funding to center appropriation. This calculation means that for every \$1 of center funds spent, center faculty returned \$4.50 in extramural funding. Extramural funding totaled \$3,042,651 this year, while expenditures for the year were \$2,360,916. The funding includes new, multi-year awards for Drs. Raul Almeida, Madhu Dhar and Amy LeBlanc, totaling \$767,665, and new one-year awards for Drs. Almeida, Cekanova, Stephen Kania, Cristina Lanzas, and Katherine Tolbert, totaling \$592,894. See “Research Funded Externally” and “Research Expenditures” on p. 6 for the fiscal year 2014 data summary.

**External Funding: \$3,042,651**

**New Grants: \$1,360,559**

During the 2013 calendar year, the 15 center faculty averaged 3.4 peer-reviewed publications (51 total) and 4.1 presentations at prestigious national and international meetings (62 total). **Figure 2** shows the number of times 2014 center faculty have been cited by others over the last five calendar years. These numbers tell us that scientists worldwide have evaluated center faculty work positively and used it to stimulate, validate, and/or support their own work in similar fields. Therefore, citations are indicators of the quality of faculty work.

Particularly noteworthy articles in 2013 were by Drs. Maria Cekanova and Barry Rouse. Dr. Cekanova published an article in the *Journal of Nuclear Medicine*. Dr. Rouse’s work was published in *Immunological Reviews* and *Progress in Retinal and Eye Research*. All these journals have an impact factor above 5.5. The impact factor is frequently used as a measure of a journal’s importance in its field. The higher the number, the more times articles published in the journal have been cited in a particular year. See Publications and Presentations (pp. 38–51) for more details.

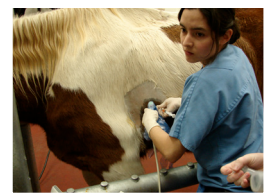


Photo: Sandra Harbison

## SUCCESS STORY — Johne's Disease Detection Device

In fiscal year 2013, the center supported Forestry, Wildlife and Fisheries Department researcher **Dr. Shigetoshi Eda** in his pursuit to perfect a portable, hand-held device to detect Johne's Disease in ruminants such as cattle. The disease affects dairy cattle, as well as other ruminants, and is contagious, chronic, and usually fatal. It is caused by a hardy bacteria related to the agents that cause leprosy and tuberculosis and is causing significant economic loss to the global dairy industry.

In 2014, Meridian Bioscience Inc. entered into a technology and commercial license agreement for the development of the device. The hope is that such an agreement will result in low cost, point-of-care detection of Johne's Disease, as well as other infectious diseases, pathogens, and physiological conditions in people and animals.

The device will save time and money because samples do not have to be sent to a lab; all that is needed is a droplet of blood or other bodily fluid, and the device can tell a health care provider if a patient is infected in a matter of minutes.

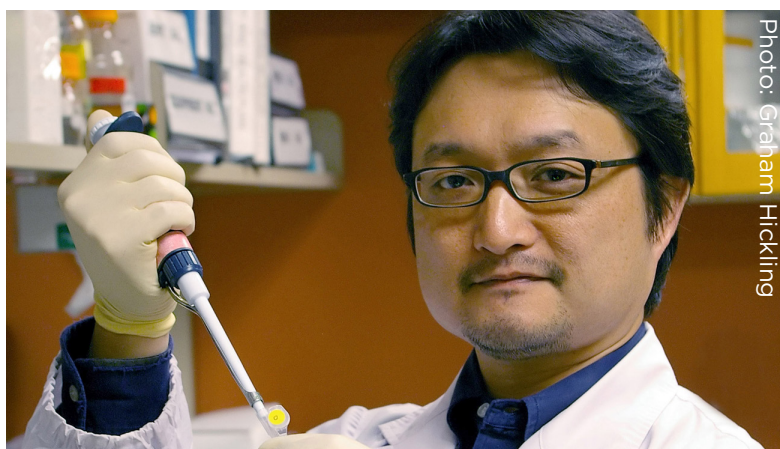
Dr. Eda developed the technology through a collaboration with **Dr. Jayne Wu**, associate professor of computer science and electrical engineering in the College of Engineering.

### Dr. Shigetoshi Eda

**Associate Professor**

**Department of Forestry, Wildlife and Fisheries**

PhD, MS, Tokyo University of Pharmacy and Life Science, Japan



**Device prototype with  
smart phone for size  
comparison**

## Introduction



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, and
- 2) Mechanisms of Disease, Pathogenesis, and Immunity

These two areas are highly interrelated, and the center plays a critical and unique role in developing these focused areas of strength in both the University of Tennessee College of Veterinary Medicine (UTCVM) and the Institute of Agriculture. These areas also encompass the “One Health” concept, wherein the interrelated disciplines of animal, human, and environmental health are combined for the betterment of all three.

## Personnel

Dr. Michael McEntee has served as director of the center since October 1, 2012, having served as interim director from February 2011 to October 2012. Dr. Reza Seddighi chaired the Research Advisory Committee responsible for selecting 2014 funded proposals. Ms. Kim Rutherford oversees submissions of faculty proposals for funds, and Ms. Misty Bailey produces the annual report.



**L–R: McEntee,  
Seddighi,  
Rutherford,  
Bailey**

# FUNDING & EXPENDITURES



## Research Funded\* Externally FY 2014

Investigator	Federal	Industry	Foundation/ Private	University	International	Total
Almeida, Raul	\$600,000	\$291,675				\$891,675
Cekanova, Maria	\$238,000		\$5,000			\$243,000
Cui, Mei-Zhen	\$357,700					\$357,700
Dhar, Madhu		\$85,572			\$21,500	\$107,072
Kania, Stephen		\$5,000				\$5,000
Lanzas, Cristina				\$55,032		\$55,032
LeBlanc, Amy	\$79,701	\$16,294	\$146,165			\$242,160
Rouse, Barry	\$823,543					\$823,543
Schuller, Hildegard	\$263,148					\$263,148
Tolbert, Katherine			\$54,321			\$54,321
<b>Totals</b>	<b>\$2,362,092</b>	<b>\$398,541</b>	<b>\$205,486</b>	<b>\$55,032</b>	<b>\$21,500</b>	<b>\$3,042,651</b>

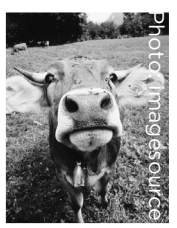
\*Represents FY 2014 receipts for active grants.

## Research Expenditures FY 2014

Investigator	Federal	Industry	Foundation/ Private	University	International	Total
Almeida, Raul	\$385,712	\$108,170				\$493,882
Baek, Seung	\$51,012					\$51,012
Cekanova, Maria			\$181			\$181
Cui, Mei-Zhen	\$311,808					\$311,808
Dhar, Madhu		\$43,622			\$9,210	\$52,832
Kania, Stephen		\$11,615	\$10,030			\$21,645
Lanzas, Cristina				\$36,474		\$36,474
LeBlanc, Amy		\$8,141	\$22,843			\$30,984
Rouse, Barry	\$794,174					\$794,174
Schuller, Hildegard	\$348,770					\$348,770
Tolbert, Katherine			\$28,498			\$28,498
Xu, Xuemin	\$98,954		\$91,702			\$190,656
<b>Totals</b>	<b>\$1,990,430</b>	<b>\$171,548</b>	<b>\$153,254</b>	<b>\$36,474</b>	<b>\$9,210</b>	<b>\$2,360,916</b>



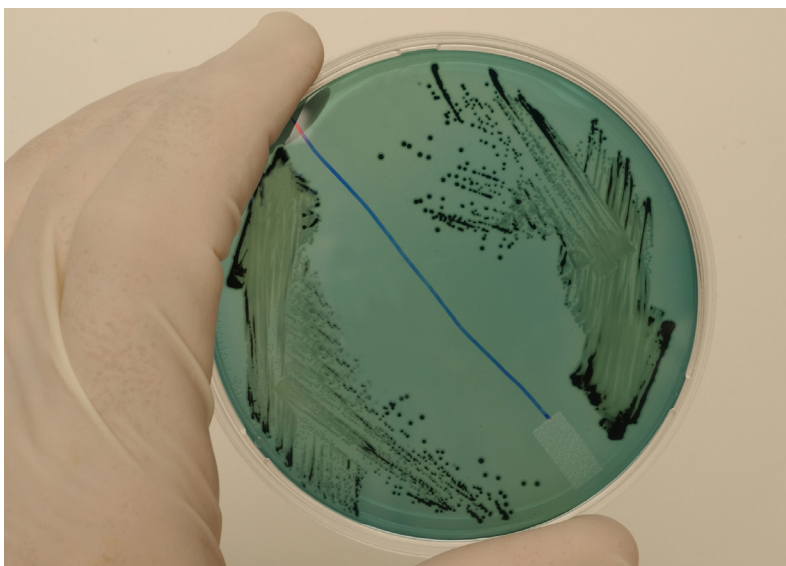
## Allocation of Funding



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

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 are new faculty who have received start-up funds. Junior members are expected to actively pursue and eventually secure external funding.

## Criteria for Funding



The Research Advisory Committee has three main criteria for funding:

**Scientific merit**

**Potential to lead to external funding**

**Relevance to the center's objectives**

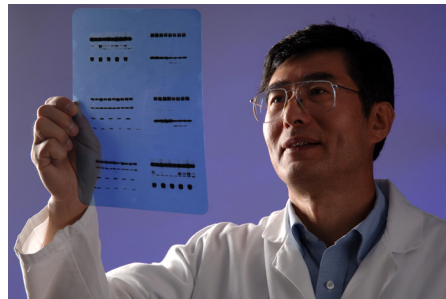


In fiscal year 2014, Dr. Dhar was funded by Medicus Biosciences, NellOne Therapeutics, and the Egyptian Cultural and Educational Bureau. She had one publication published in the peer-reviewed journal *Materials Science and Engineering, C: Materials for Biological Application*, which has a 5-year impact factor of 3.076. Her research focus is outlined on p. 29 in the Faculty Reports section.



**DR. MADHU DHAR**

Dr. Xu's research interests are detailed on p. 37 in the Faculty Reports section. In calendar year 2013, he published two peer-reviewed articles in the journal *Biochimica et Biophysica Acta – Molecular Basis of Disease*. This journal has an impact factor of 5.098, meaning articles published within that journal are referenced by others an average of 5.098 times.

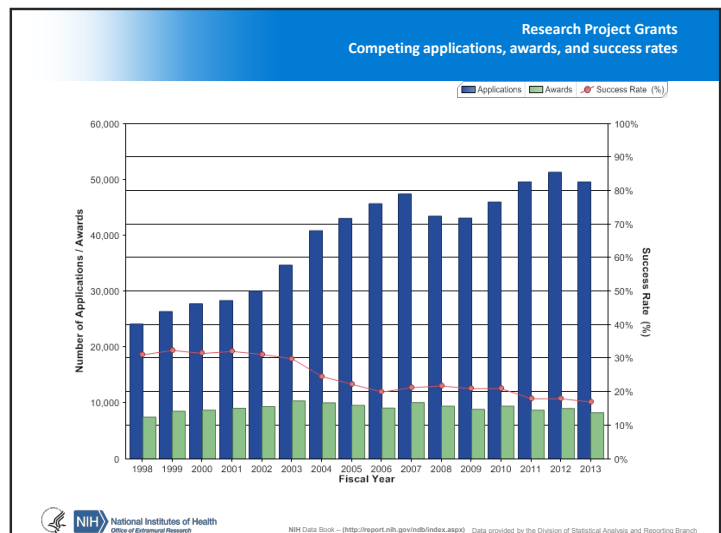


**DR. XUEMIN XU**

## BRIDGE FUNDS

The center provided \$70,638 in bridge funding to support Dr. Madhu Dhar and Dr. Xuemin Xu while they pursue additional sources of external funding.

Such bridge funds are important and necessary on occasion for any academic researcher, but particularly now because of the national trend of low funding success rates. For example, in 2014, applicants to the National Institutes of Health had a 19.3% overall funding success rate. In other words, for every 100 grant proposals that are submitted, only about 19 are funded. When looking at specific institutes to which center faculty regularly apply, including the National Cancer Institute (NCI); the National Heart, Lung, and Blood Institute (NHLBI); and the National Institute of Allergy and Infectious Diseases (NIAID), the funding rate drops to 13.2%, 11.1%, and 16.6%, respectively.

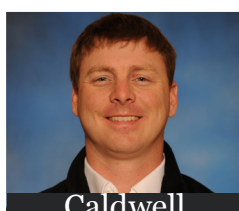




Biskup



McCormick



Caldwell



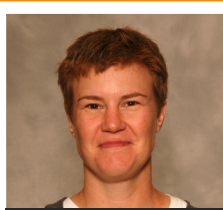
Gerhold



Cannon



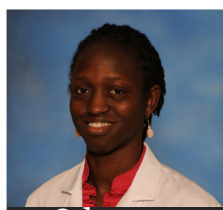
Frazier



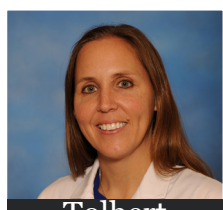
Jesty



May



Odunayo



Tolbert

## START-UP FUNDS

The center provided \$78,334 in start-up funds for 11 junior faculty members to secure additional external funding in 2014.

Faculty Member	Area of Research	\$ Amount
<b>Biomedical and Diagnostic Sciences</b>		
Dr. Richard Gerhold	Wildlife parasitology, including <i>Trichomonas gallinae</i> in birds	10,000
<b>Large Animal Clinical Sciences</b>		
Dr. Marc Caldwell	Production animal medicine, infectious diseases of livestock	8,333
Dr. Karen McCormick	Large animal clinical medicine, including testing blood coagulation variation in horses	5,000
<b>Small Animal Clinical Sciences</b>		
Dr. Jeffery Biskup	Soft tissue and orthopedic surgery, minimally invasive techniques	6,667
Dr. Claire Cannon	Targeted therapies for canine osteosarcoma and feline oral squamous cell carcinoma	8,334
Dr. Sara Frazier	Oncology, including effects of pioglitazone, rosiglitazone, carboplatin, mitoxantrone, and doxorubicin to treat canine cancers	5,000
Dr. Sophy Jesty	Cardiology, including heart disease in dogs, cats, and horses, and specifically, arrhythmias in the exercising animal	5,000
Dr. Elizabeth May	Bacterial skin and ear infections, staphylococcal bacteria and mechanisms of resistance, hair coat disorders in Schipperkes	5,000
Dr. Adesola Odunayo	Emergency and critical care	5,000
Dr. Katherine Tolbert	Feline gastrointestinal disease as a translational model for human disease	15,000

## Infrastructure & Supplies



The center promotes the research infrastructure of both the UTCVM and the Institute of Agriculture through the purchase and maintenance of essential research equipment. The Research Advisory Committee reviews requests based on three criteria: justification of need, current availability of equipment, and number of investigators who may benefit. In support of the UTCVM's research enterprise in 2014, the center funded the purchase of a high-resolution digital camera (\$1,710) for use in Dr. Madhu Dhar's laboratory. The camera, which is attached to a microscope, allows researchers to photograph immunostained cells. It is being used by several different laboratories, including those of Drs. Xuemin Xu, Mei-Zhen Cui, and Seung Joon Baek, but it can be used by anyone doing cell culture work and is the only one of its kind at the UTCVM.

**\$3,841 helped fund equipment, service contracts, & supplies**

A maintenance contract (\$1,780) for a flow cytometer in the Virology and Immunology Laboratory was supported by the center, as was a replacement objective lens (\$351) for a microscope used mainly by Drs. Dhar, Cui, and Maria

Cekanova to photograph growing cells. The microscope is available to use by anyone in the UTCVM. The center also purchased sheath fluid used for flow cytometry procedures for the research of Drs. Barry Rouse, Madhu Dhar, Neal Stewart (Plant Sciences), Eric Boder (Chemical Engineering), Louisa Rispoli (Animal Science), and Tim Sparer (Microbiology).



Photo: pixabay

## COMPARATIVE & EXPERIMENTAL MEDICINE AND PUBLIC HEALTH RESEARCH SYMPOSIUM

The center was a major sponsor of the Comparative & Experimental Medicine and Public Health Research Symposium, which brought together researchers from 16 different departments for a 2-day-long event that included special seminars on novel therapeutic and molecular imaging agents for amyloid disease, as well as using evidence-based practices for successful lifestyle interventions for pediatric and adult weight management.

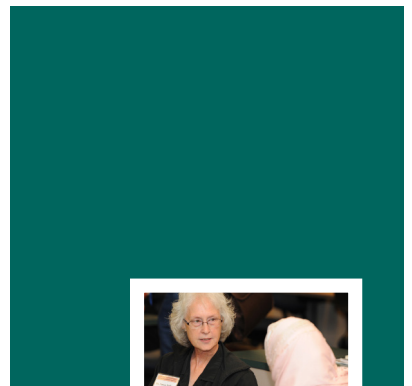
Featured was Dr. Jonathan Wall (shown below), director of the Amyloid and Preclinical Molecular Imaging Laboratory at the UT Graduate School of Medicine. Also featured was Dr. Hollie Raynor, director of Public Health Nutrition within the UT Department of Nutrition. The symposium culminated with an awards reception.

Forty-three researchers from the Institute of Agriculture presented talks, including heavy participation by members of the Biomedical and Diagnostic Sciences and Small Animal Clinical Sciences departments. They were among 57 new scientists to present, and at the end of the 2 days, the institute was able to boast six winners of travel awards.

The center sponsored four of the 2013 award winners to present at one international and three national scientific meetings during fiscal year 2014. Pelagie Favi presented at the Materials Research Society meeting in Boston, MA. Dr. Kusum Rathore traveled to San Diego, CA, to present at the World Stem Cell Summit. Dr. Maria Prado went to Milwaukee, WI, to present at the Annual Conference of the American Association of Bovine Practitioners, and Dr. Sonia Kuhn presented at the American College of Veterinary Ophthalmologists meeting in Rio Grande, Puerto Rico.

The symposium was designed to allow sharing of research results, promote collaboration, and provide new investigators meeting-format experience via 10-minute presentations, with 5 minutes for questions from the audience. It remains an entirely unique, cross-campus, cross-disciplinary venue for presenting new research data on the Knoxville campuses of the university.

<http://www.vet.utk.edu/research/symposium/>





## About the CWH

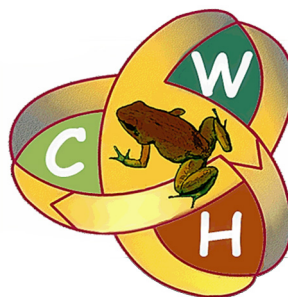
The Center for Wildlife Health was established in 2003 at the UT Institute of Agriculture (UTIA). The Organized Research Unit (CWH ORU) supports the mission of the CWH by fostering research collaborations between UTIA and UT Knoxville faculty members with expertise in wildlife and zoonotic diseases.

**\$15,000 helped fund  
the CWH-ORU**

The CWH ORU comprises 15 research faculty from different disciplinary areas. The backbone of the unit is a **seed grant program** geared toward collecting new data that will supplement research proposals for extramural funds.

**Travel grants** to present results at conferences and initiate new collaborations outside of UT are another component. The CWH ORU further fosters interdisciplinary collaboration by inviting eminent scientists to UT for seminars and interaction with faculty, staff, and students.

## CENTER FOR WILDLIFE HEALTH Organized Research Unit



### Seed Projects Funded in 2014

Gary McCracken, Amanda Janicki, Marcy Souza: Etiology of wing damage on endangered gray bats (*Myotis grisescens*), \$5,000

Richard Gerhold, Lisa Muller, Chunlei Su: Transmission of *Toxoplasma gondii* among white-tailed deer in Tennessee, \$10,000

Jayne Wu, Shigetoshi Eda: Development and evaluation of an in-field diagnostic device for bovine tuberculosis in wild animals, \$10,000

Benjamin Fitzpatrick, Marcy Souza: Prevalence and partitioning of *Salmonella* among wildlife, \$10,000

Feng Chen, Heather Williamson, Shigetoshi Eda: Identifying signature volatile chemicals from pathogenic *Mycobacteria* of importance to wildlife health and zoonotic diseases, \$5,000

Susan Lenhart, Melissa Kennedy, Rebecca Trout-Fryxell, Rebecca Penrose-Wilkes, Agricola Odoi: Screening of communal dogs for tick-borne zoonoses in Zimbabwe, \$10,000

Gary McCracken, Riley Bernard, Emma Willcox: Epidemiology of *Pseudogymnoascus destructans*: Variation in fungal load on active bats throughout winter in the Southeast, \$5,000

**The CWH ORU is co-sponsored by the UT Office of Research and UTIA AgResearch.**

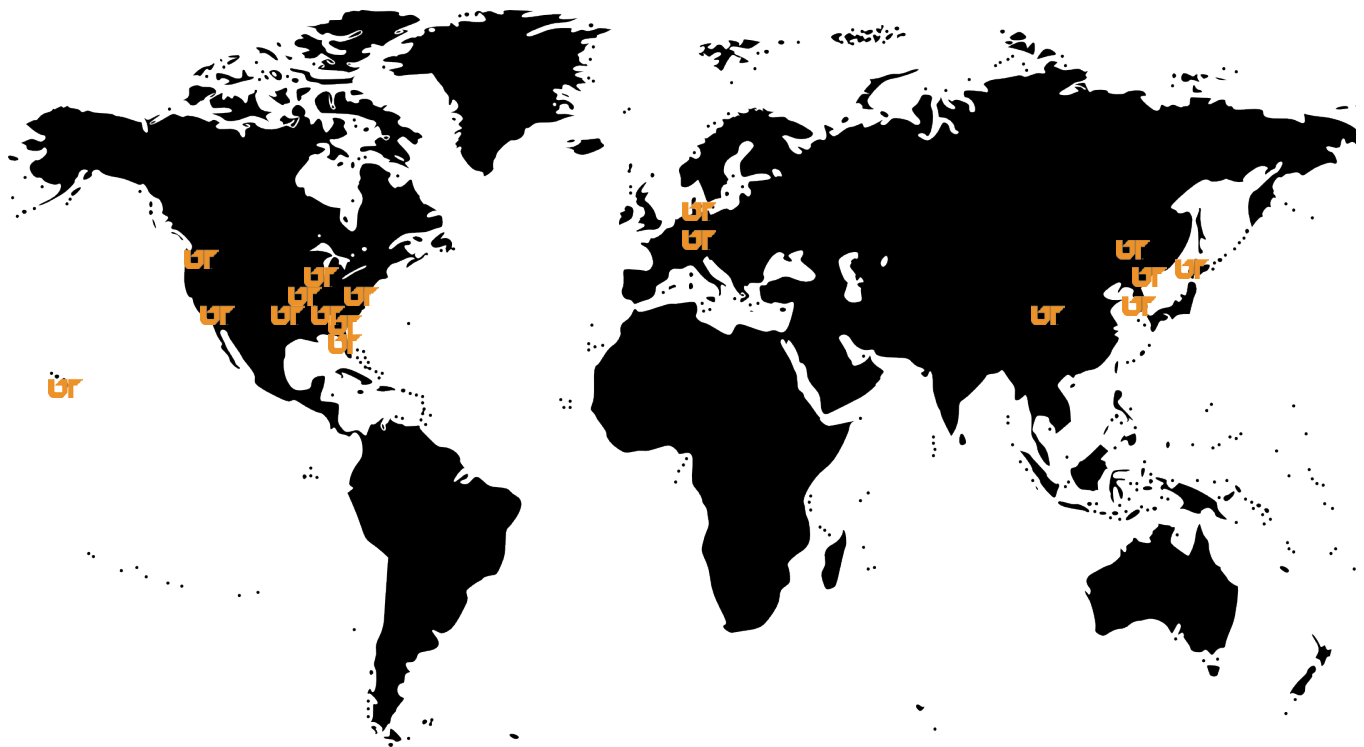


## DISSEMINATION OF RESEARCH



Faculty are encouraged to share their research via speaking engagements for professional groups, community groups, and civic groups. A complete list of faculty publications and presentations for the 2013 calendar year can be found in the Publications and Presentations section (pp. 38 to 51).

Through scientific conferences, Center of Excellence faculty share their research with a worldwide audience. ***The map below showcases where center faculty research was presented in 2013.***



To promote the research of faculty and graduate students, as well as to encourage networking and collaboration, the center sponsors opportunities to present research results at national and international conferences. During fiscal year 2014, the center funded seven individuals (\$2,730), as outlined below and on the next page.

**Pelagie Favi** presented her research at the Materials Research Society in Boston in December 2013. Favi is a PhD student studying in Materials Science and Engineering with Dr. Madhu Dhar, research associate professor in the Large Animal Clinical Sciences Department. Her travel was funded through an award given at the 2013 Comparative & Experimental Medicine and Public Health Research Symposium (CEMPH).

## DISSEMINATION OF RESEARCH

Also a travel award winner from CEMPH, **Dr. Kusum Rathore** (seen at right) presented a poster at the World Stem Cell Summit in San Diego, CA, in December 2013. Dr. Rathore is a post-doctoral research associate in the laboratory of Dr. Maria Cekanova.

Two DVM-seeking students in the Summer Student Research Program shared results from their projects with fellow students and faculty members, 600 of them, to be exact, at the national Merit Veterinary Scholars Symposium in East Lansing, MI, in August 2013. **Marissa Torre** and **Jessica Chin**, who worked with Drs. Stephen Kania and Linda Frank, and Dr. Angela Witzel, respectively, presented posters at the symposium.

Another DVM student, **Dottie Williams** (seen at right), attended the 2013 American College of Veterinary Radiology Meeting in Savannah, GA, where she presented a poster on the research she did with Dr. Erica Fields in 2012 as part of the Summer Student Research Program.

In addition, **Dr. Maria Prado**, research assistant professor in the Department of Animal Science, gave an oral presentation at the Annual Conference of the American Association of Bovine Practitioners in Milwaukee, WI, in September 2013. Dr. Prado's projects were funded by the center in 2012 and 2008.

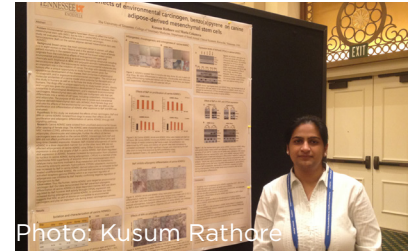


Photo: Kusum Rathore



### Kusum Rathore, PhD

Presented her research at the World Stem Cell Summit in San Diego, CA, in December 2013.



Photo: Dottie Williams



### Dottie Williams, BA

Presented her research at the American College of Veterinary Radiology meeting in Savannah, GA.

# Dissemination of Research

## Popular Press and Media



A surgical collaboration between UTCVM and the UT Medical Center was featured by numerous media outlets, including WBIR, Channel 10, seen here.

In addition to faculty speaking engagements, the UTCVM 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.

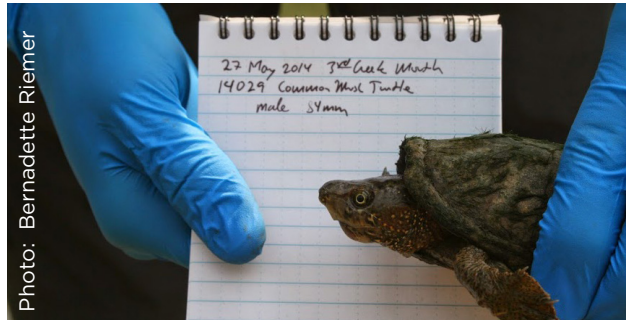
The UTCVM has a recurring spot on local NBC affiliate WBIR, Channel 10's "Live at Five at Four" news show. The college has also launched a Facebook page, a VolVet Connect alumni e-newsletter, and a quarterly referring DVM newsletter. At the end of August 2014, the Facebook page had 4,474

"likes" from individuals from 10 different countries. Page administrators post clinical and research information for users. VolVet Connect contains items of note aimed at DVM alumni, including UTCVM research news, and continuing education and networking opportunities. In each issue of the rDVM newsletter, a Comparative and Experimental Medicine graduate student's research focus is presented. UTCVM is also on Twitter (2,081 followers), has a YouTube channel with 99 subscribers and 47,579 views since its inception in 2008, and a Pinterest presence with 133 followers.

*Veterinary Vision* is a yearly magazine that explores the research, teaching, and outreach services of the UTCVM. The Winter 2013 issue (see below) highlighted the Alzheimer's research of center faculty member Dr. Xuemin Xu.



In an effort to foster interest in careers in biomedical research and enhance appreciation for scientific investigation, inquiry, and the acquisition of new knowledge, the center once again helped provide opportunities for veterinary students to do research at the UTCVM.



Students participated in laboratory and field research and attended weekly professional development seminars, during which guest speakers addressed topics such as career opportunities in research, compliance issues in laboratory animal care, science writing, and the grant proposal process. They also participated in the Comparative & Experimental Medicine and Public Health Research Symposium. Near the end of the 10-week program, the students presented their research findings to their colleagues and to UTCVM faculty and staff. *Since 2008, students in this program have co-published 34 peer-reviewed research articles.*

## SUMMER STUDENT RESEARCH PROGRAM



The center funded 20 student salaries for the Summer Student Research Program. A grant from Merial funded two students, and grants from the American Veterinary Medical Foundation (AVMF) and Winn Feline Foundation funded one student each. Dr. Stephen Kania, a center faculty member, coordinated the program along with Dr. Linda Frank; they received a \$5,000 grant from Merial to help support the program. From Merial, two additional student salaries were funded in summer 2014; one of these students also received travel funds from Merial to present the research on a poster at the 2014 Merial-NIH Veterinary Scholars Program Symposium in Ithaca, NY, at Cornell University. One center-sponsored student and one AVMF-funded student attended the symposium, as well.

To maximize student participation, the program is open to both center and non-center faculty. During fiscal year 2014, six center faculty and four junior center members participated in the program. The center will continue to encourage participation of its faculty.

**\$5,000 from Merial helped fund the Summer Student Program**



# Summer Student Research Program

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

**Liza Balouzian**, 3rd year. **Faculty Mentor:** Dr. Sara Frazier.

New York, NY. Studied biological sciences at Cornell University, Ithaca, NY. **Summer Project:** Investigated the effects of skin biopsy and lymph node aspiration on the appearance of tissues in healthy cats using magnetic resonance imaging (MRI) and computed tomography (CT). Biopsy and aspiration are sometimes used to diagnose tumors, as are MRI and CT.



**Jamie Bishop**, 3rd year. **Faculty Mentor:** Dr. Julie Albright.

Sevierville, TN. Studied animal science and biology at Berry College, Rome, GA. **Summer Project:** Evaluated stress levels and wound healing in dogs getting spayed in a shelter-type setting. The hypothesis was that dogs getting human interaction, toys, and anti-anxiety medications would have lower cortisol levels (be less stressed) and therefore heal faster from the spay.

**Callie Blackford**, 3rd year. **Faculty Mentor:** Dr. Hwa-Chain Robert Wang.

Lenoir City, TN. Studied biology at Maryville College, Maryville, TN. **Summer Project:** Studied several anti-cancer agents and their mechanisms when used in combination. The goal of the project was to find two drugs that acted selectively and synergistically to induce death of cancer cells. Successful findings would allow drug doses to be lowered so fewer negative effects would be seen with chemotherapy.

**Melissanne Dalena**, 2nd year. **Faculty Mentor:** Dr. Joseph Weigel.

Trumbull, CT. Studied animal and poultry science at North Carolina State University, Raleigh, NC. **Summer Project:** Sought to determine bone mineral density in dogs with chronic cranial cruciate ligament injury by using dual energy X-ray absorptiometry and force plate analysis. The long-term goal is to evaluate characteristics of dogs that have successful surgical repair of a cranial cruciate ligament injury.

**Timothy Estabrooks**, 2nd year. **Faculty Mentor:** Dr. Jennifer Stokes.

Knoxville, TN. BS in animal science with a minor in biology from the University of Tennessee, Knoxville. **Summer Project:** Investigated the effects of low-level laser therapy on dogs with benign fatty tumors. Such tumors are unsightly and can impact the animal's range of motion, depending on where they are located on the body.

**Amber Futrell**, 2nd year. **Faculty Mentor:** Dr. David Anderson.

Humboldt, TN. Studied agriculture with a concentration in animal science at the University of Tennessee Martin. **Summer Project:** Looked at pain management in cattle to find reliable markers to detect pain in a long-term effort to improve animal welfare.

**Jessie Gammel-Kolodney**, 2nd year. **Faculty Mentor:** Dr. Bente Flatland.

Denver, CO. BS in psychology with minors in biology and neuroscience from Ursinus College, Collegeville, PA. **Summer Project:** Evaluated bedside instruments, such as glucometers and hand-held chemistry analyzers, veterinarians use to obtain quick information about a patient's status. Results



# Summer Student Research Program

were analyzed from these instruments and compared to those from laboratory instruments to ensure the bedside instruments were giving accurate and comparable results.

**Jenny Holt**, 2nd year. **Faculty Mentor:** Dr. Richard Gerhold.

Sevierville, TN. BS in animal science from the University of Tennessee, Knoxville. **Summer Project:** Used fast technology for analysis (FTA) cards to detect *Trichomonas gallinae* DNA from biological samples collected from wild birds. *T. gallinae* is a parasite that can cause difficulty breathing, starvation, and eventual death. It is causing high-scale mortality in free-ranging birds in Great Britain and has been discovered in the United States, as well. If successful, wildlife biologists could use FTA cards in the field to conduct prevalence studies.

**Rachel Howell**, 3rd year. **Faculty Mentors:** Dr. Katie Tolbert and Dr. Adesola Odunayo.

Bartlett, TN. BS in animal and dairy science, Mississippi State University, Starkville, MS. **Summer Project:** Evaluated the efficacy of a commonly-used treatment protocol for gastric acid suppression in dogs. The results will impact treatment protocols, drug waste, and proper use of client funds.

**Amber Irwin**, 2nd year. **Faculty Mentor:** Dr. Darryl Millis.

Matthews, NC. BS in biology with a minor in chemistry from Anderson University, Anderson, SC. **Summer Project:** Performed orthopedic exams and morphological analysis to determine a mathematical equation to predict stride length in dogs. This baseline information can be used by veterinarians on abnormal dogs to determine stride length differences to aid in detection of subtle lameness; early detection will allow earlier treatment and might halt or reverse lameness progression.

**Brittni Jones**, 2nd year. **Faculty Mentor:** Dr. Brian Whitlock.

Sevierville, TN. BS in animal science, University of Tennessee, Knoxville. **Summer Project:** Sought to improve the reproductive health of bulls by establishing the prevalence rate of *Trichomonas foetus*, a protozoan venereal disease, in the Tennessee beef bull population. Results from bull breeding soundness exams that had been collected on paper forms for 25 years were also converted to electronic forms to prepare for future analysis of exam failures and what factors contribute to a failing score.

**Steven McIntyre**, 3rd year. **Faculty Mentor:** Dr. Silke Hecht.

Greeneville, TN. BS in animal science, University of Tennessee, Knoxville. **Summer Project:** Compared a new magnetic resonance imaging (MRI) sequence with computed tomography (CT) to evaluate skull trauma in cadaver dogs. This research would pave the way for use of MRI in evaluating bone in cases of head trauma to lower treatment cost and reduce examination time in urgent cases.

**Clayton McQuiddy**, 3rd year. **Faculty Mentor:** Dr. Mike Jones.

Nashville, TN. BS in biology, High Point University, High Point, NC. **Summer Project:** Created a database to describe the population of wild birds brought into the wildlife clinic of the UT Veterinary Medical Center from 2008 to 2013. This database will allow determination of the reasons for presentation and the outcome to assess the health of various species, as well as potential threats to the population.

# Summer Student Research Program

**Preston Morris**, 3rd year. **Faculty Mentors:** Drs. Marc Caldwell, James Schumacher, and David Anderson.

Whitesburg, TN. Studied animal science at the University of Tennessee, Knoxville. **Summer Project:** Measured stress hormones in cattle and horses and learned proper handling techniques to reduce stress.

**Jeremy Nix**, 2nd year. **Faculty Mentor:** Dr. Becky Trout-Fryxell.

Knoxville, TN. BA in history and Russian, Brigham Young University, Provo, UT; MS in education, University of Tennessee, Knoxville. **Summer Project:** Compared the mosquito population at a constructed wetland with that same area several years before it became a wetland. The mosquitoes will be tested for avian malaria, canine heartworm, and la crosse virus, as well as tested to determine which species of mosquito are feeding on which hosts. This information can help mitigate potential increased incidence of disease due to increased mosquito presence.

**Bernadette Riemer**, 3rd year. **Faculty Mentor:** Dr. Marcy Souza.

Oak Ridge, TN. BBA in business management and entrepreneurship with a minor in pre-veterinary medicine, University of South Carolina, Columbia, SC. **Summer Project:** Used a genetic approach to evaluate the prevalence and partitioning of salmonellosis in wildlife at a Knoxville greenway. The hope is to be better able to predict disease transmission dynamics and determine which hosts may serve as spreaders of infection, potentially to humans.



**Robert Rush**, 3rd year. **Faculty Mentors:** Dr. Edward Ramsay and Dr. Rebecca Wilkes.

Carlinville, IL. Currently a DVM student at the University of Illinois at Urbana-Champaign. Studied biology with a minor in chemistry at Illinois College, Jacksonville, IL. **Summer Project:** Worked on developing an alternative and practical method of delivering vaccines to Amur tigers to prevent canine distemper virus (CDV), and studied how well available CDV vaccines work in tigers.

**Amber Sherry**, 2nd year. **Faculty Mentors:** Dr. Madhu Dhar and Dr. David Anderson.

Dandridge, TN. BS in biology, University of Southern Maine, Gorham/Portland, ME. Studied biology at Elmira College, Elmira, NY. **Summer Project:** Worked on creating an optimal surgical method for testing the effect of a novel biomaterial in bone and determining if adult mesenchymal stem cells are biocompatible. Success of the project will allow bone healing rates to be measured. In the future, the work may be applicable to large animal species, such as goats.

**Shannon Shuttle**, 3rd year. **Faculty Mentor:** Dr. Madhu Dhar.

New Ipswich, NH. Studied biology with a minor in chemistry at Illinois College, Jacksonville, IL. **Summer Project:** Tracked the movement and migration of adult mesenchymal stem cells injected into horses by transfecting the cells with iron. Magnetic resonance imaging (MRI) was used to track the cells throughout clinically-relevant areas of the body, such as bones and joints, for future regenerative medicine studies.

## Summer Student Research Program

**Katie Stainbrook**, 2nd year. **Faculty Mentors:** Dr. Elizabeth May and Dr. David Bemis.

Fremont, OH. BA in communication studies, College of Wooster, Wooster, OH. Studied pre-veterinary medicine at Middle Tennessee State University, Murfreesboro, TN. **Summer Project:** Performed antimicrobial susceptibility testing on an amino acid commonly used in human and veterinary medicine to treat acetaminophen toxicity and help break up mucus in the lungs. The goal was to evaluate the amino acid's effectiveness against common bacterial species found in severe ear infections in dogs.

**Ashley Steuer**, 2nd year. **Faculty Mentors:** Dr. Richard Gerhold and Dr. Deb Miller.

Mattawan, MI. Studied animal science with a minor in Spanish at Michigan State University, East Lansing, MI. **Summer Project:** Studied the prevalence of *Trichinella* parasite species in two wild bird species: American pine martens from northern Michigan and Fishers from Pennsylvania. Because *Trichinella* can be transmitted to humans, the proximity of these recently-reintroduced birds to humans creates a possible risk for human infections. Monitoring will continue to be done.

**Jennifer Storer**, 2nd year. **Faculty Mentor:** Dr. Marc Caldwell.

Fayetteville, TN. **Summer Project:** Assessed the levels of two proteins to determine if they can be used as markers for recognizing *Mannheimia haemolytica* bronchopneumonia in calves. Bronchopneumonia is a common, very contagious illness in cattle, and cattle typically receive antibiotics to prevent it. If a field-side detection method is available, it could lessen the potential for overuse of antibiotics.

**Riley Thompson**, 2nd year. **Faculty Mentor:** Dr. Melissa Kennedy.

Cookeville, TN. BS in agriculture, Tennessee Technological University, Cookeville, TN. **Summer Project:** Collected blood samples and ticks from communal dogs in Zimbabwe to determine the presence and species of *Ehrlichia* and the prevalence of ehrlichiosis.

**Ellie Weyant**, 2nd year. **Faculty Mentor:** Dr. Stephen Kania and Dr. Linda Frank.

Pittsburgh, PA. BS in biology with a minor in psychology, Allegheny College, Meadville, PA. **Summer Project:** Developed a real-time polymerase chain reaction test to better diagnose the serious skin infection dermatophilosis in horses. This test will allow for quicker and more accurate diagnosis so necessary treatment can begin.

## Five-Year Benchmark Data

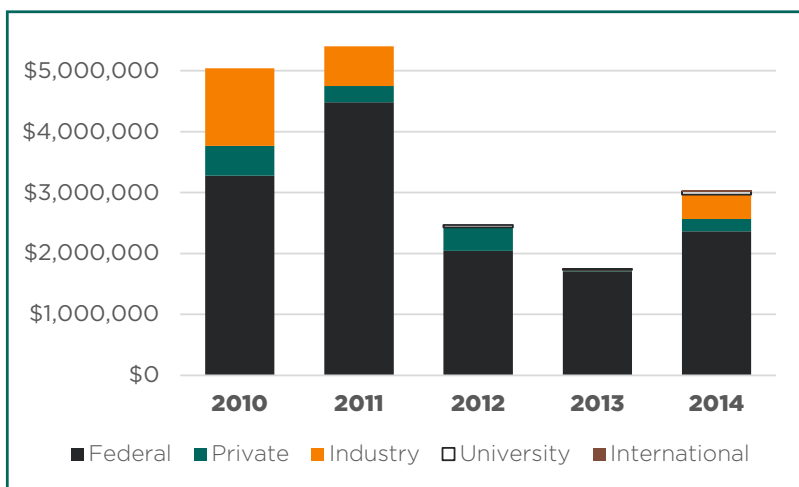


Productivity among center faculty has been stable during the last 5-year period. From 2010–2014, center faculty published 247 articles in peer-reviewed journals and gave 246 presentations at national and international meetings.

Total research funding was up from \$1,746,627 in 2013 to \$3,042,651 in 2014 (Fig. 3). Figure 4 shows federal funding from 2010–2014.

Expenditures per faculty member were \$157,334 in FY 2014. Over the past 5 years, the mean expenditure amount per faculty member has been \$204,829. The 5-year average return on the state's investment in the center is 5.3:1, the ratio of research expenditures to the state's appropriation. For comparison, benchmark data from 2010–2014 are summarized in Figs. 3–5.

## Benchmark Summary (2010–2014)



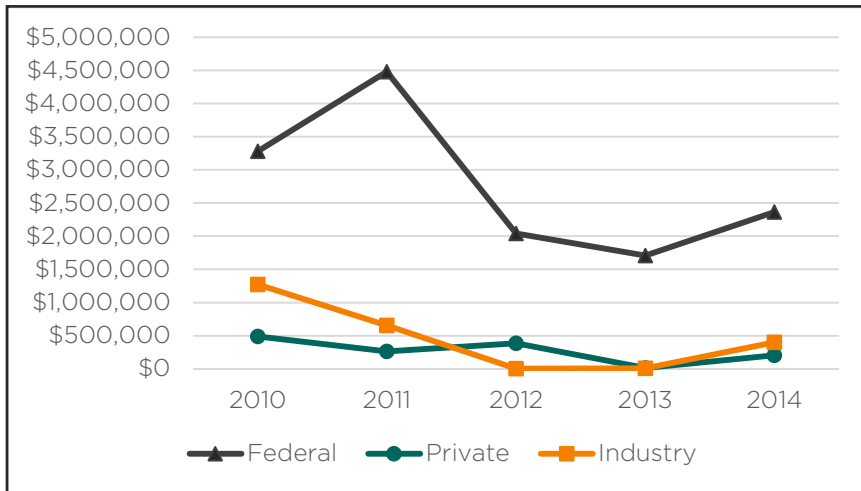
**Average refereed articles per faculty member: 3.4**

**Federal funding total: \$13,872,384**

**Average return on investment: 5.3:1**

**Fig. 3.** External Funding by Source (FY 10–14)

## Benchmark Summary (2010–2014)

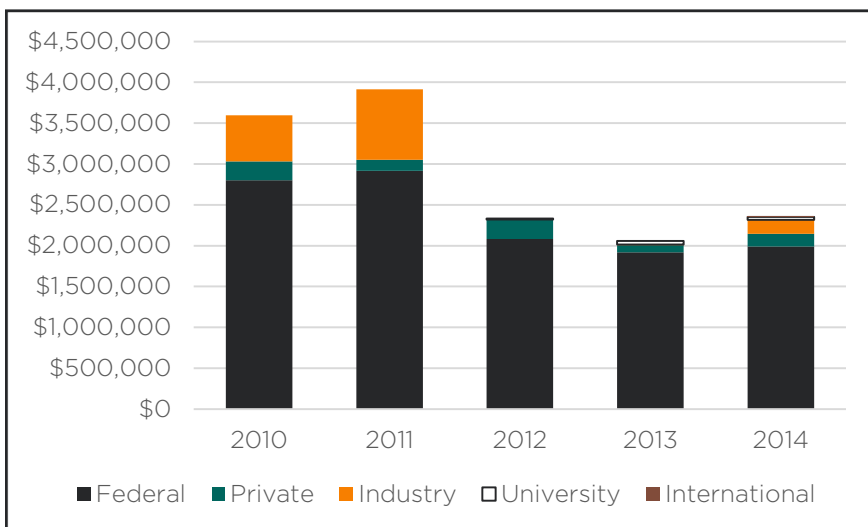


**Fig. 4.** External Funding by Major Source (FY 10–14)

Center faculty members have worked hard to maintain external funding during this difficult economic period and related constriction of research sponsorship from all quarters, in particular the National Institutes of Health (NIH).

Biomedical research support has stagnated in recent years, with the economic downturn and lack of an effective federal commitment to sustain or increase funding. Our center faculty has experienced this with increased competition for fewer dollars, resulting in a significant reduction in extramural funding over the past few years; this has been true for all universities.

We do have some cause for hope with a wave of federal grants in recent weeks awarded to center faculty members and, in particular, several of our more junior members, which bodes well for renewed growth of extramural funding coming into our Center. The UTCVM will continue to look for new ways to support faculty in obtaining the extramural sponsorship needed to grow discovery in the center's mission areas. This will most likely take the form of enhancing opportunities for collaboration, focused investment in research equipment and facilities, and greater technical grant writing assistance, where needed.



**Fig. 5.** Research Expenditures by Source (FY 10–14)





## FUTURE PLANS

- Increase investment in research on production animal disease, particularly in the area of infectious pathogens
- Continue to promote interdisciplinary, cross-departmental collaboration for development of new directions in discovery related to the concept of one health
  - iBME, the newly formed Institute for Biomedical Engineering
  - Wildlife and environmental health
  - NeuroNet, another newly formed consortium of UT faculty bringing together various disciplines to better study the nervous system
  - Analytics, such as mass spectrometry and microscopy, and new methods in biological system data acquisition and analysis
- Greater access to UT equipment, facilities, and expertise
- New equipment funded to sustain and further new research in the areas of
  - Amyotrophic lateral sclerosis
  - Infectious disease spread and epidemiologic modeling in dairy animal facilities
- Federal funding for DVM student research training

In contrast to extramural funding, our Summer Student Research Program has been on a constant upward trajectory in recent years, with improvements in program content, faculty participation, student interest, and external sources of funding that supplement that provided through our center. For example, since 2012, the UTCVM has received student support through the Merial Veterinary Scholars Program, which has enabled us to send more students to the important annual Merial-NIH Research Symposium. There, students present their research to a national audience and have the opportunity to network extensively with other students, faculty, and administrators from veterinary colleges around the country and the world.

Center faculty submitted an NIH training grant last year for additional short-term funding for our student research program. The program officer strongly recommended submission of a revised application, and this proposal was recently resubmitted. An NIH training grant would raise our research profile across the board in our college and the Institute of Agriculture in part from the additional funding provided, but primarily with the consequent enhancement of research credibility of the center, paving the way for additional training and research grants.

**FUTURE**

**For more information**

[http://www.vet.utk.edu/  
coe/index.php](http://www.vet.utk.edu/coe/index.php)

# Toward Developing a Vaccine for Mastitis in Dairy Cattle



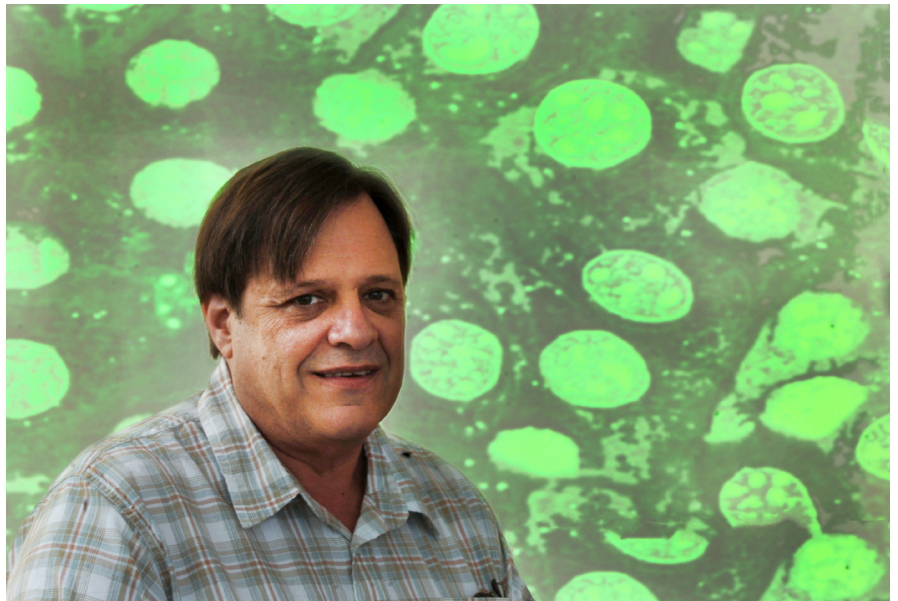
In dairy cows, mastitis — inflammation of the udder — negatively affects milk production and quality. The disease costs U.S. dairy producers an estimated \$2 billion annually. One of the causative agents of mastitis, the bacterium *Streptococcus uberis*, is the focus of Dr. Almeida's research.

In the early stages of *S. uberis* infections, virulence factors play major roles in determining how the bacteria adapt and survive in the cow host. Virulence factors are molecules secreted by *S. uberis* that allow the bacteria to colonize, evade the host's immune system, and obtain nutrition from the host.

Dr. Almeida has discovered that the production of several different virulence factor proteins is increased in concert with *S. uberis* infection. His goal is to determine the proteins' pathogenic and immunogenic properties toward developing a vaccine to prevent *S. uberis* mastitis. If successful, such research is expected to define more effective means of improving herd health and productivity. Ultimately, this research could save the dairy industry billions of dollars annually.

## Dr. Raul Almeida

Research Associate Professor  
Animal Science



# Sulindac Sulfide as a Cancer-Fighting Tool



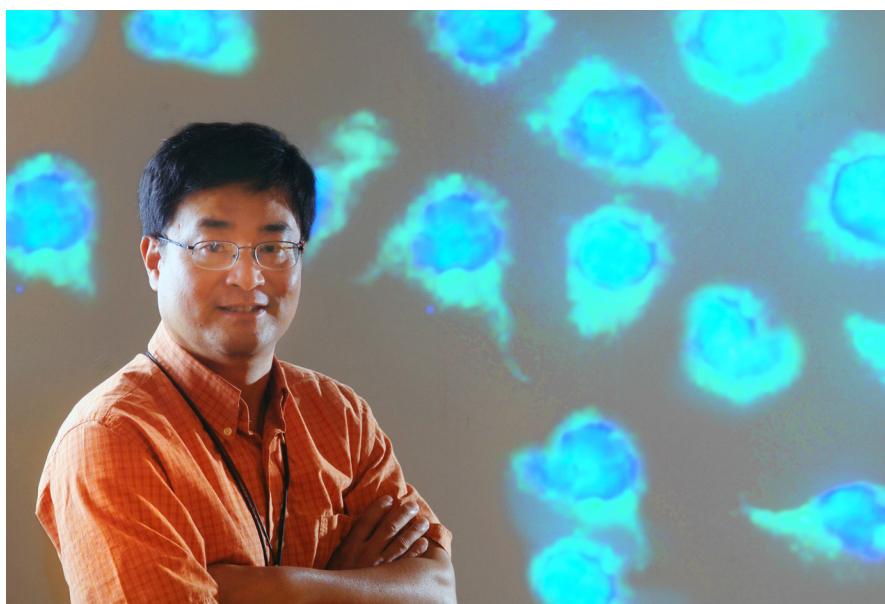
**N**on-steroidal anti-inflammatory drugs (NSAIDs) have been shown to suppress colorectal cancer cell growth and induce cancer cell death. Dr. Baek is investigating the NSAID sulindac sulfide (an aspirin-like compound), which he believes could play a role in tumor suppressive activity.

His focus is on KLF4, a transcription factor protein, found in the gut, that binds to specific DNA sequences and controls the transcription of genetic information. It appears that colorectal cancer cells cause KLF4 to split, or splice, into three major KLF4 genes—one (wild-type) that suppresses tumor activity and two that inhibit that suppressive activity. Dr. Baek hypothesizes that sulindac sulfide restores wild-type forms of KLF4 and thus assists KLF4 in doing its job to suppress colorectal cancer.

Evidence to support the role of sulindac sulfide in KLF4 production would provide a strong scientific foundation for comprehensive clinical trials.

## **Dr. Seung Joon Baek**

Associate Professor  
Biomedical and Diagnostic  
Sciences



# Diagnosing Bovine Respiratory Disease



**B**ovine respiratory disease is a common, persistent, and severe animal welfare issue for beef and dairy cattle in close contact, such as at feedlots, stock yards, and milking barns. It is highly contagious, and despite advances in prevention and treatment, the disease is difficult to diagnose. In fact, veterinarians have typically relied on visual observations alone to make a diagnosis.

Elevated surfactant protein D has been implicated as a sensitive and specific marker of early alveolar inflammation and damage in humans and other species, but it has yet to be evaluated in bovine pneumonia. Dr. Caldwell seeks to develop a test to detect bovine surfactant protein D and hopes that it will provide an objective measurement of alveolar inflammation.

Such a test would allow veterinarians to more accurately identify morbid animals and determine the effectiveness of therapeutic interventions.

## **Dr. Marc Caldwell**

Assistant Professor  
Large Animal Clinical Sciences





# Determining Tumor Shrinkage via Fluorescence



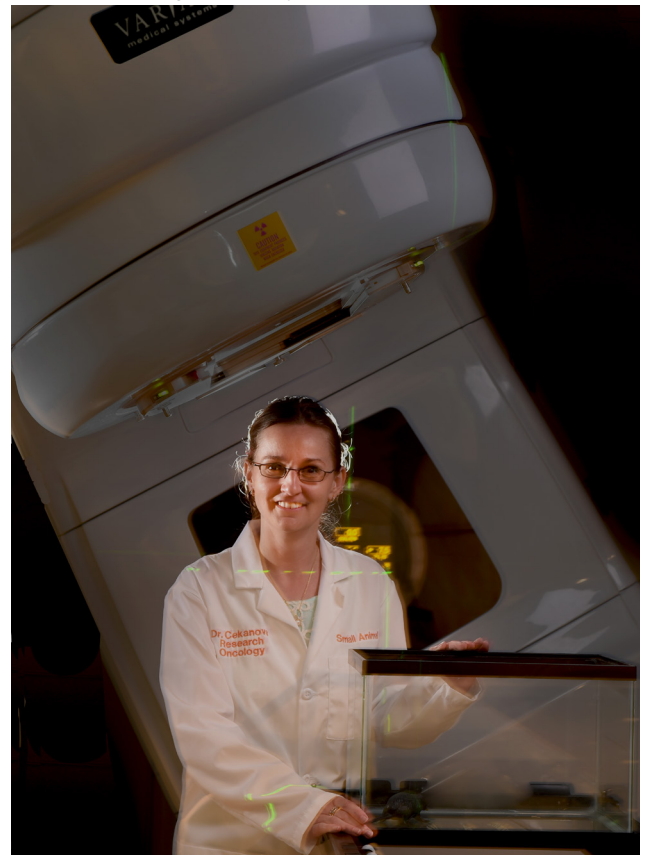
**I**n some people, as well as in pet cats and dogs, tumors respond well to radiation therapy; while in other people and pets, cancers do not respond at all or only partially to radiation therapy.

Dr. Cekanova's project focuses on using the enzyme cyclooxygenase-2 (COX-2) as a marker to allow clinicians to determine how well a patient's cancer is responding to therapy. Tumors like oral squamous cell carcinomas and transitional cell carcinomas in the urinary system contain increased levels of COX-2, which is a target of a promising new imaging probe: fluorocoxib A. Dr. Cekanova and others proved that a tumor absorbs fluorocoxib A when the COX-2 enzyme is present in tumor cells. Ideally, as radiation therapy (such as that delivered by equipment shown at right) causes the tumor to shrink, less fluorocoxib A will be absorbed.

The absorption of fluorocoxib A by cancer cells can be viewed using optical detection systems. The project is now being undertaken on rodents, but will likely lead to clinical trials in dogs and, eventually, humans.

## Dr. Maria Cekanova

Research Assistant Professor  
Small Animal Clinical Sciences



# Effect of LPA and Lipid-Laden Foam Cells on Atherosclerosis



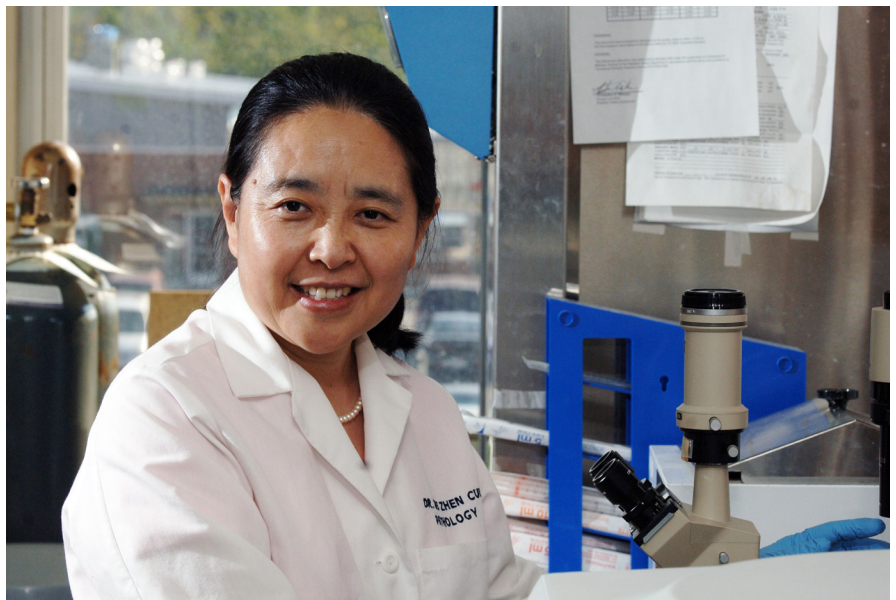
**T**he Centers for Disease Control estimate that 600,000 people die in the United States every year due to heart disease. Atherosclerosis, otherwise known as hardening of the arteries, is a form of heart disease that leads to heart attack and stroke.

Atherosclerosis is a chronic inflammatory disease that results, in part, from the formation of foam cells within the arteries. These foam cells are loaded with lipids (fats), and Dr. Cui recently discovered that lysophosphatidic acid (LPA) is associated with foam cell formation. The goal of her research is to determine how LPA triggers foam cell formation.

Dr. Cui's recent experiments revealed that a specific set of genes is highly induced by LPA, and the function of these genes is currently unknown. She is exploring their function in foam cell formation. If her hypothesis is realized, LPA might eventually become a new target for therapeutic drugs to treat atherosclerosis.

## Dr. Mei-Zhen Cui

Professor  
Biomedical and Diagnostic  
Sciences



# Repairing Bone via a Unique Combination of Biomaterial and Adult Stem Cells



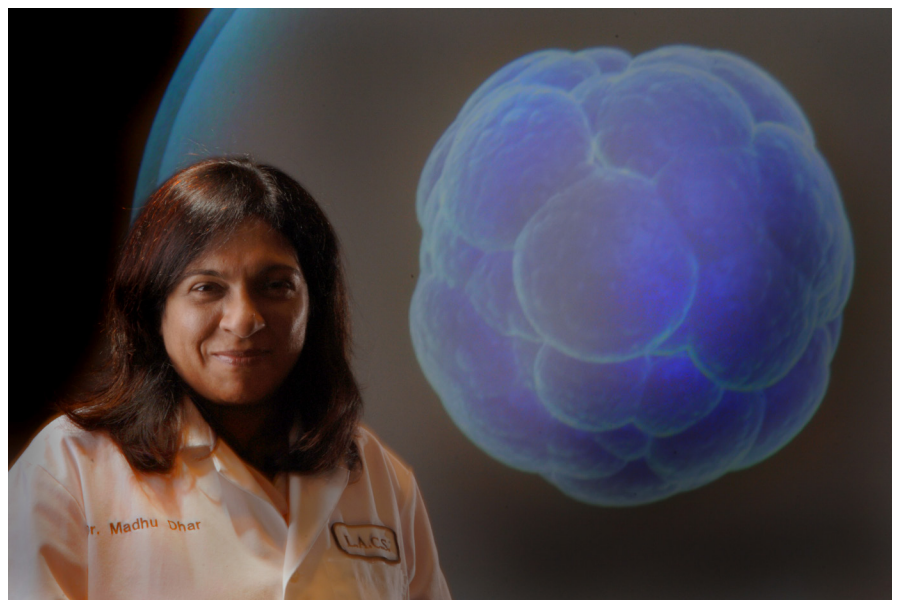
Current treatment for bone injuries and diseases involves bone grafts to replace missing or damaged bone. These grafts may be made of materials such as metals and ceramics, from pieces of a patient's own bone from elsewhere in the body, or from pieces of donor bone. These techniques have proven to be useful, but they suffer from inherent challenges such as possible infection or rejection.

Dr. Dhar is seeking to find a new way to repair and restore full function of damaged bone tissue. Working with a team at the University of Arkansas (Dr. A. Biris), she is engineering bone tissue via a combination of adult mesenchymal stem cells (AMSCs) with the potential to form a bone cell and biomaterials that mimic bone structure and promote growth and function of new bone.

These AMSCs can be isolated from any adult tissue but have the potential to differentiate into bone cells. Dr. Dhar hypothesizes that the combination of these two methods will speed bone healing without the threat of infection, inflammation, or rejection.

## Dr. Madhu Dhar

Research Associate Professor  
Large Animal Clinical  
Sciences



# Antibiotic-Resistant *Staphylococcus* Transfer between Humans and Dogs



**S***taphylococcus aureus* is one of the most common bacterial species responsible for hospital-originating infections. It manifests as skin infections, septicemia, and pneumonia and has become resistant to penicillins. In fact, the relatively recent and disturbing increase in resistance to available antibiotics is now recognized as a significant threat in all areas of health care. Likewise, *S. pseudintermedius*, which is the main cause of skin infection in dogs, has also become resistant to the drugs previously used to treat it. Now, 30% of *S. pseudintermedius* isolates seen in the laboratories of Dr. Kania and Dr. Bemis are methicillin resistant, and many are multi-drug resistant.

Co-infection with both bacteria has been reported in humans and dogs, creating an opportunity for gene exchange and the interspecies transfer of antibiotic resistance. However, little is known about the exchange of genetic material between *S. pseudintermedius* and *S. aureus*. Dr. Kania and Dr. Bemis aim to determine the rate of interspecies transfer of resistance among these bacteria, and map where this resistance is showing up across the country.

Increasing pet ownership and widespread use of animal-assisted therapies provide more opportunities for close contact and co-mingling of microorganisms between humans and animals. It is important to understand how such organisms may exchange resistance properties and to maintain surveillance for emerging resistance.

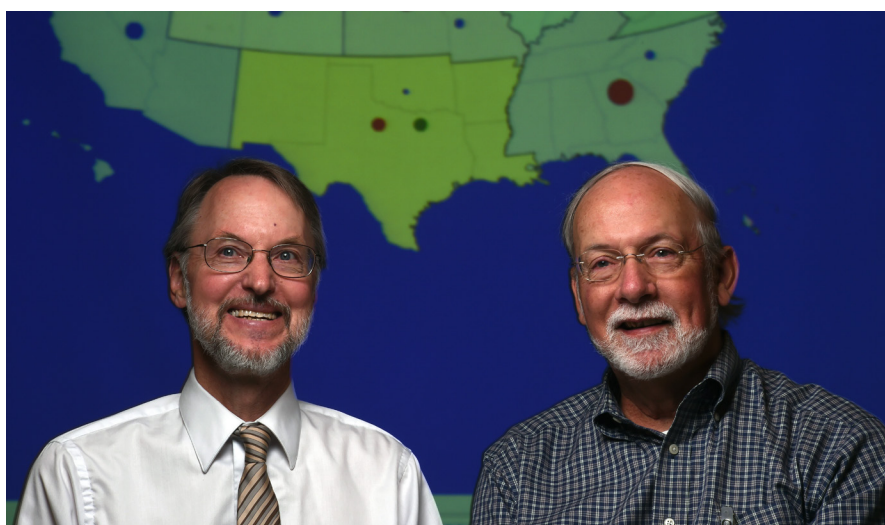
## Dr. Stephen Kania

Professor

## Dr. David Bemis

Professor

Biomedical and Diagnostic Sciences





# Mathematical Modeling for Disease Transmission in Cattle



Numerous pathogens are able to infect hosts via environmental transmission pathways without direct contact between hosts; however, these pathways are poorly understood, limiting our ability to control environmental pathogens. Dr. Lanzas' research objective is to develop quantitative methods to characterize and evaluate the role of contact between animals and their environment in the transmission of pathogens.

Her research team constructed a contact network (seen below) of the interaction between beef cattle and their associated environments using animal movement data generated by real-time location systems. Their plan is to develop statistical methods to characterize the contact network and integrate the results with simulation models that represent disease transmission pathways.

Dr. Lanzas is particularly concerned with duration of contact, as well as animal behavior, that might contribute to transmission. Such models would allow beef producers to better predict ways to prevent disease transmission in their herds.

## Dr. Cristina Lanzas

Assistant Professor  
Biomedical and Diagnostic  
Sciences



# Using Viruses to Kill Cancer Cells



**S**tandard management for cancer typically involves chemotherapy, surgery, and/or radiation therapy. In both humans and dogs, these treatments are expensive and often cause diminished quality of life. Dr. LeBlanc is testing a new approach to cancer therapy that has proven successful in preclinical studies.

Oncolytic virotherapy uses engineered oncolytic viruses to simultaneously directly kill cancer cells and induce anti-tumor immunity. In a collaboration with the Mayo Clinic, Dr. LeBlanc is using vesicular stomatitis virus to treat dogs with naturally-occurring cancers. She is using positron emission tomography (PET) and computed tomography (CT) to reach her goal of determining factors that might influence variability of response to the treatment.

Treating cancer in the dog in a clinical trial such as this one also provides a unique opportunity to quickly transfer the knowledge gained in dogs to treat in humans.

## **Dr. Amy LeBlanc**

Professor  
Small Animal Clinical Sciences



# Preventing Blindness by Inhibiting the Formation of Stromal Keratitis Lesions



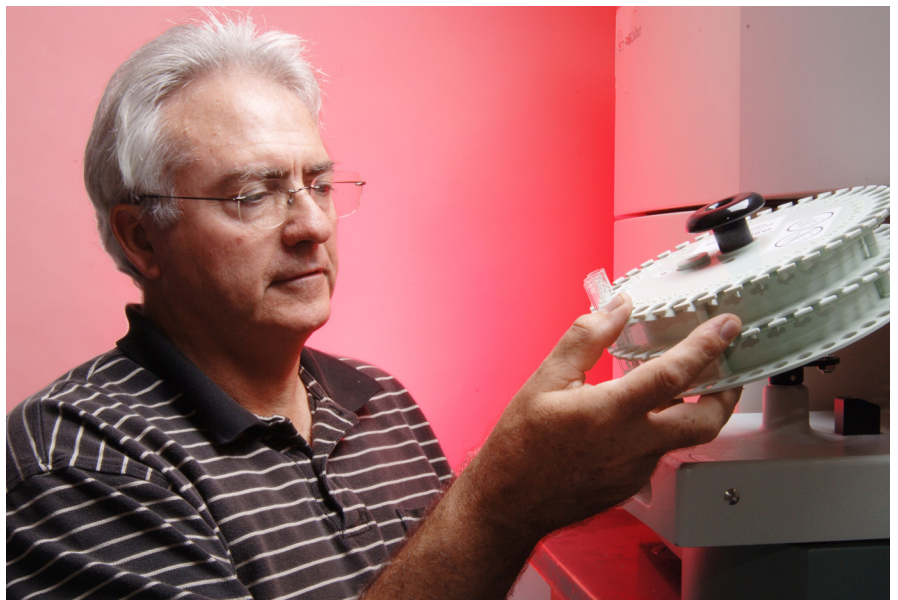
Infection with herpes simplex virus can result in stromal keratitis, a chronic inflammatory disease of the eye that is a significant cause of human blindness. A key to controlling the severity of lesions is to identify the cellular and molecular events responsible for tissue damage. This challenge is being investigated in Dr. Rouse's laboratory using a rodent model for the ocular lesion.

Because no currently available treatment for stromal keratitis completely removes the virus from infected persons, periodic new lesion episodes typically occur. Recently, Dr. Rouse's research team has focused on determining exactly how lesions form and how that process can be exploited in a new form of therapy. Because stromal keratitis lesions are mainly orchestrated by CD4<sup>+</sup>T cells, one approach could be to eliminate or inhibit those cells. Another major target is inhibiting the formation of new blood vessels in the normally avascular cornea.

The current focus of Dr. Rouse's work is to understand how to shift the balance of inflammatory events to favor resolution of all lesions. This is being achieved by using approaches that focus on microRNA species as well as enhancing the function of regulatory cells and regulatory factors in the cornea.

## **Dr. Barry Rouse**

Distinguished Professor  
Biomedical and Diagnostic  
Sciences



# Effects of Nicotine Replacement Therapy on Pancreatic Cancer Treatment



Smoking is an established risk factor for pancreatic cancer, and to help patients diagnosed with this disease quit smoking, doctors often prescribe nicotine replacement therapy, such as nicotine patches or chewing gum, to accompany chemotherapy.

Dr. Schuller's research team suspected that such chronic exposure to low-dose nicotine might reduce the responsiveness of pancreatic cancer to the chemotherapy drug used most to treat it: gemcitabine. She found that exposure of pancreatic cancers to small amounts of nicotine for 7 days inhibited the effectiveness of gemcitabine as a treatment.

These experimental data suggest that continued moderate smoking and use of nicotine replacement therapy may negatively impact therapeutic outcomes of gemcitabine on pancreatic cancer and that clinical studies in cancer patients are warranted.

## **Dr. Hildegard Schuller**

Distinguished Professor  
Biomedical and Diagnostic  
Sciences





# A Novel Way to Study Gastrointestinal Disease in Cats and Humans



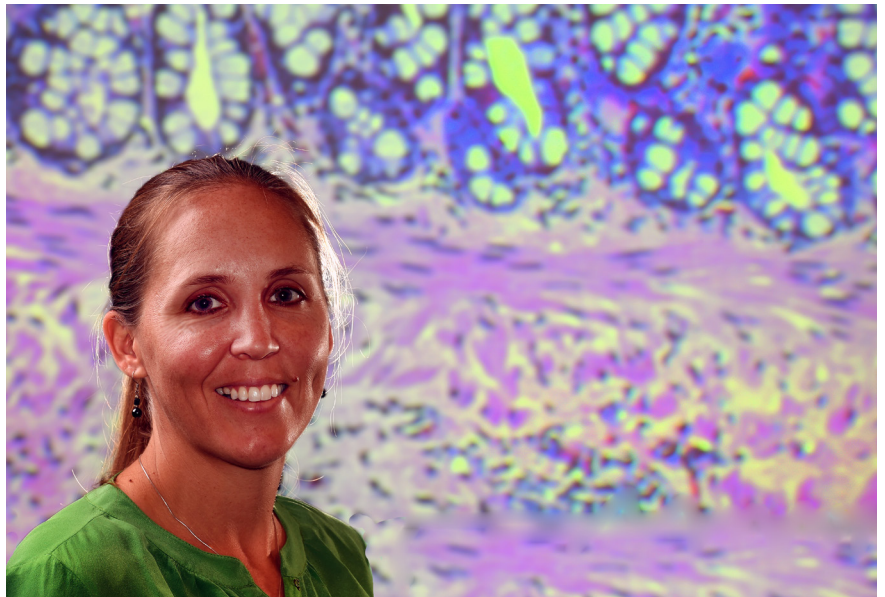
The mammalian intestinal tract is lined by a single layer of epithelial cells that are responsible for the life-sustaining absorption of nutrients and water while simultaneously preventing bacteria and other toxins from entering the body. Failure of these functions is a primary cause or consequence of nearly all gastrointestinal (GI) diseases.

For decades, researchers have used cell lines that are grown in artificial conditions to study the mechanisms of GI diseases because of the difficulty in establishing intestinal epithelial cells in culture. While highly informative, such protocols call into question translation of the findings from bench to bedside.

Dr. Tolbert's goal is to culture a primary feline intestinal epithelium cell line (shown below) to more accurately replicate normal intestinal tissues to be used to not only study GI diseases in cats, but also to serve as a model to investigate human GI conditions. Because of the similarities between the GI tract of cats and humans, as well as their propensity toward the same GI diseases, these cells would likely be a useful and novel tool for studying human GI conditions, such as inflammatory bowel disease.

## **Dr. Katherine Tolbert**

Assistant Professor  
Small Animal Clinical Sciences



# Testing a Novel Drug to Prevent and Treat Breast Cancer



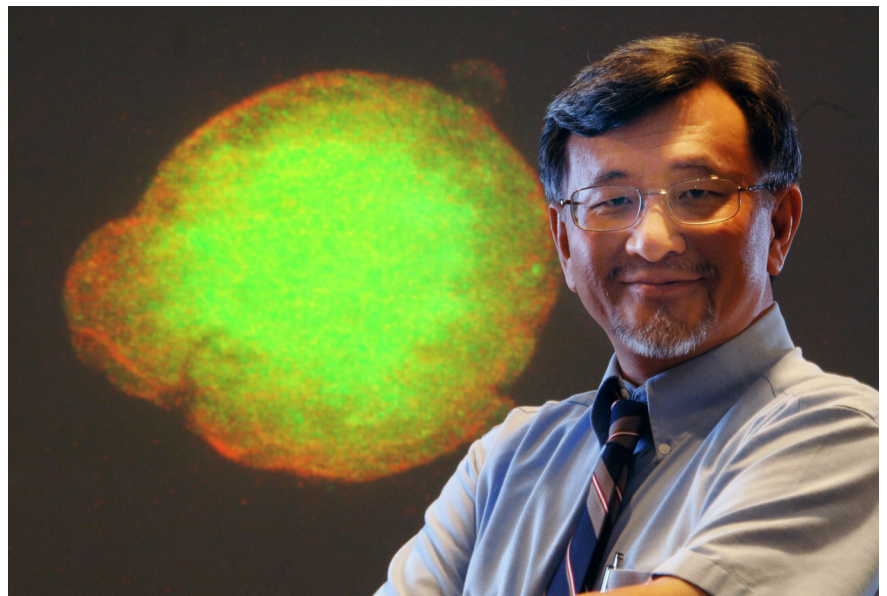
**B**efore cancer forms, cells in the body develop cancer-associated properties that are induced by various cancer-causing substances (carcinogens). Most breast cancers are caused by long-term exposure to low doses of carcinogens in the environment. Dr. Wang's research team is focusing on stopping these cancer-associated properties from developing in order to prevent or halt the progression of breast cancer.

He is studying the ability of the drug dipyridamole (DPM) to block or intervene in cancer development. DPM is a drug that is already approved by the U.S. Food and Drug Administration to inhibit blood clot formation, and Dr. Wang is testing its efficacy to also treat breast cancer. To do this, he has developed a cell model system that mimics long-term cancer formation due to low doses of carcinogens. This novel system not only allows him to study how cancer forms, but also to test preventive agents (like DPM) that could be used to treat cancer or prevent its occurrence.

His hope is that these results will be rapidly translated into clinical studies testing the benefits of DPM in humans.

## Dr. Hwa-Chain Robert Wang

Professor  
Biomedical and Diagnostic  
Sciences



# Understanding the Genes Associated with Alzheimer's Disease



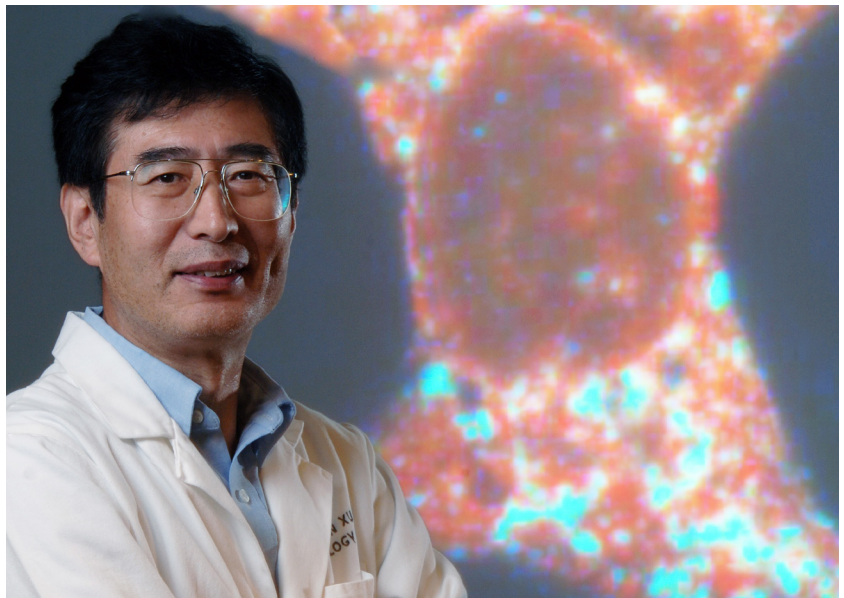
**T**he Alzheimer's Association says that more than 5 million Americans are living with Alzheimer's disease. One of the major markers of the disease is accumulation of abnormal protein structures in the brain. These structures include various types of beta amyloid deposits. Thus far, three genes have been identified to cause Alzheimer's disease. Two of these genes, presenilin-1 and -2, contribute to the disease by helping govern amyloid beta formation. It has also been suggested that presenilin causes neuron death.

However, the exact mechanisms by which presenilin is able to encourage the development of Alzheimer's disease are unknown. Dr. Xu's research goal is to determine how presenilin-1 induces neuronal cell death. Neurons are primary nerve cells that process and transmit information. For patients with Alzheimer's disease, the neurons involved affect short-term memory, as well as recognition and decision-making ability.

Because Alzheimer's disease is so poorly understood, in order to determine the best way to treat or prevent the disease, research like Dr. Xu's is imperative.

## **Dr. Xuemin Xu**

Professor  
Biomedical and Diagnostic  
Sciences



# PUBLICATIONS & PRESENTATIONS

## Raul Almeida

*MVD (DVM equivalent), Universidad del Litoral (Argentina)*

*MSc, PhD, Veterinary Microbiology, Iowa State University*

### Presentations

Kerro Dego O, DA Luther, SP Oliver, AM Saxton, LJ Hauser, **RA Almeida**. Transcriptome expression profiles of *S. uberis* during bovine intramammary infections. Annual Meeting of the National Mastitis Council, San Diego, CA; Jan 2013.

Oliver SP, **Almeida RA**, Pighetti GM, Krawczel PD, Petersson-Wolfe CS, Bewley JM, Garkovich L, Amaral-Phillips DM, Arnold M, Nickerson SC, Hill-Ward S, DeVries A. Southeast Quality Milk Initiative: Implementing science-based recommendations to control mastitis and improve milk quality in the Southeast. Annual Meeting of the National Mastitis Council, San Diego, CA; Jan 2013.

**Almeida RA**, O Kerro Dego, ME Prado, SI Headrick, BE Gillespie, LS Siebert, GM Pighetti, SP Oliver. Protective effect of anti-rSUAM antibodies on *Streptococcus uberis* intramammary infections. Annual Meeting of the National Mastitis Council, San Diego, CA; Jan 2013.

Pighetti GM, Headrick S, Lewis M, Gillespie B, Young C, Siebert L, Wojakiewicz L, Kerro Dego O, **Almeida R**, Oliver SP. Inflammation and clearance of *Streptococcus uberis* significantly tied to genetic variation in CXCR1 amino acid expression. Annual Meeting of the National Mastitis Council, San Diego, CA; Jan 2013.

**Almeida RA**, O Kerro Dego, SI Headrick, MJ Lewis, C Young, BE Gillespie, LS Siebert, DA Luther, GM Pighetti, SP Oliver. Defining the role of SUAM in the pathogenesis of *Streptococcus uberis* mastitis using a SUAM-negative gene deletion mutant. Annual Meeting of the National Mastitis Council, San Diego, CA; Jan 2013.

O Kerro Dego, **RA Almeida**, SI Headrick, MJ Lewis, C Young, BE Gillespie, LJ Siebert, DA Luther, GM Pighetti, PD Krawczel, SP Oliver. Intramammary and systemic immunological profile of dairy cows during the non-lactating and early peripartum period. 2013 Conference of Research Workers in Animal Disease annual meeting, Chicago, IL; Nov 2013.

GM Pighetti, L Wojakiewicz, LJ Siebert, HG Kattesh, SA Lockwood, MJ Roberts, SI Headrick, MJ Lewis, C Young, BE Gillespie, O Kerro Dego, PD Krawczel, **RA Almeida**, SP Oliver. Cytokine expression by milk somatic cells following experimental intramammary challenge with *Streptococcus uberis* during the post-partum period. Conference of Research Workers in Animal Disease annual meeting, Chicago, IL; Nov 2013.

Oliver SP, Pighetti GM, **Almeida RA**. Characterization of the immune response and protection following *Streptococcus uberis* experimental challenge in cows vaccinated with SUAM. USDA NIFA Animal Welfare Project Director Meeting, Chicago, IL; 2013.

Oliver SP, GM Pighetti, O Kerro-Dego, **RA Almeida**. Characterization of the immune response & protection following experimental challenge in dairy cows vaccinated with *Streptococcus uberis* adhesion molecule (SUAM). 2013 USDA-AFRI project director meeting, Maryland; October 2013.

Kerro Dego O, Headrick SI, Lewis MJ, Young C, Gillespie BE, Siebert LS, Luther DA, Pighetti GM, Oliver SP, **Almeida RA**. Role of SUAM in the pathogenesis of *Streptococcus uberis* mastitis. Comparative & Experimental Medicine and Public Health Research Symposium, Knoxville, TN; May 2013.

Kerro Dego O, Prado ME, Headrick SI, Lewis MJ, Young C, Gillespie BE, Siebert LS, Luther DA, Pighetti GM, Oliver SP, **Almeida RA**. Protective effect of anti-SUAM antibodies on *Streptococcus uberis* mastitis. Comparative & Experimental Medicine and Public Health Research Symposium, Knoxville, TN; May 2013.



# PUBLICATIONS & PRESENTATIONS

## Seung Joon Baek

MS, Agricultural Chemistry, Seoul National University (Korea)

PhD, Human Genetics, University of Maryland

### Publications

Wang X, **Baek SJ**, Eling TE. The diverse roles of nonsteroidal anti-inflammatory drug-activated gene (NAG-1/GDF15) in cancer. *Biochemical Pharmacology* 2013;85:597-606.

Lee SH, Min KW, Zhang X, **Baek SJ**. 3,3'-diindolylmethane induces activating transcription factor 3 (ATF3) via ATF4 in human colorectal cancer cells. *Journal of Nutritional Biochemistry* 2013;24:664-671.

Kim JM, Kosak JP, Lim JK, Kissling G, Germolec DR, Zeldin DC, Bradbury JA, **Baek SJ**, Eling TE. NAG-1/GDF15 transgenic mouse has less white adipose tissue and a reduced inflammatory response. *Mediators of Inflammation* 2013;641851.

Pandith H, Zhang X, Thongpraditchote S, Wongkrajang Y, Gritsanapan W, **Baek SJ**. Effect of siam weed extract and its bioactive component scutellarein tetramethyl ether on anti-inflammatory activity. *Journal of Ethnopharmacology* 2013;147:434-441.

Kang SU, Lee B-S, Lee S-H, **Baek SJ**, Shin YS, Kim C-H. Expression of NSAID-activated gene-1 by EGCG in head and neck cancer: involvement of ATM-dependent p53 expression. *Journal of Nutritional Biochemistry* 2013;24:986-999.

Pandith H, Zhang X, Liggett J, Min KW, Gritsanapan W, **Baek SJ**. Effect of *Chromolaena odorata* extract on wound healing activity. *ISRN Dermatology* 2013;168269.

Imchen T, Manasse J, Min KW, **Baek SJ**. Characterization of PPAR dual ligand MCC-555 in AOM-induced colorectal tumorigenesis. *Experimental Toxicology and Pathology* 2013;65:919-924.

Jeong JB, Choi J, **Baek SJ**, Lee SH. Reactive oxygen species mediate tolfenamic acid-induced apoptosis in human colorectal cancer cells. *Archives of Biochemistry and Biophysics* 2013;537:168-175.

Jeong JB, Yang X, Clark R, Choi J, **Baek SJ**, Lee SH. Tolfenamic acid-induced apoptosis is mediated by NF- $\kappa$ B activation in human colorectal cancer cells. *Carcinogenesis* 2013;34:2350-2360.

Zhang X, Lee SH, Min KW, McEntee MF, Jeong JB, Li Q, **Baek SJ**. Nonsteroidal anti-inflammatory drug tolfenamic acid inhibits colorectal tumorigenesis via endoplasmic reticulum stress. *Cancer Prevention Research* 2013;6:1-11.

Zhang X, Min KW, Liggett JL, **Baek SJ**. Disruption of transforming growth factor- $\beta$  (TGF- $\beta$ ) pathway by tolfenamic acid via ERK MAP kinase pathway. *Carcinogenesis* 2013;34:2900-2907.

### Presentations

**Baek SJ**. Nonsteroidal anti-inflammatory drug activated gene (NAG-1/GDF15) in cancer. University of Tennessee Cancer Research Symposium, Knoxville, TN; Oct 2, 2013.

# PUBLICATIONS & PRESENTATIONS

Zhang X, Lee SH, **Baek SJ**. Tolfenamic acid suppresses intestinal tumorigenesis through inhibiting cyclin D1 translation. American Association for Cancer Research annual meeting Washington, DC; Apr 2013.

## David Bemis

*PhD, Veterinary Bacteriology, Cornell University*

### Publications

Solyman SM, CC Black, V Perreten, B Duim, E van Duijkeren, JA Wagenaar, LC Eberlein, LN Sadeghi, **DA Bemis**, SA Kania. Multilocus sequence typing (MLST) for characterization of *Staphylococcus pseudintermedius*. *Journal of Clinical Microbiology* 2013;51:306–310.

Wells J, J Bartges, S Kania, **D Bemis**, T Gluhak. Association between presence of urovirulence factors, phylogenetic class, and antimicrobial resistance patterns in 159 uropathogenic *Escherichia coli* samples isolated from dogs. *Open Journal of Veterinary Medicine* 2013;3:199–203.

Gold K, P Reed, **D Bemis**, DL Miller, MJ Gray, M Souza. Efficacy of common disinfectants and terbinafine HCl at inhibiting the growth of *Batrachochytridium dendrobatidis* in culture. *Diseases of Aquatic Organisms* 2013;107:77–81.

Olin SJ, JW Bartges, RD Jones, **DA Bemis**. Diagnostic accuracy of a novel point-of-care urine bacteriologic culture test in dogs. *Journal of the American Veterinary Medical Association* 2013;243:1719–1725.

**Bemis DA**. 2013 Bordetellosis fact sheet [update]. In: Gamble KC, MM Clancy (eds). *Infectious Diseases of Concern to Captive and Free Ranging Animals in North America*, 2<sup>nd</sup> ed. Infectious Disease Committee, American Association of Zoo Veterinarians, Yulee, FL. 1098 pp. Available at: <http://www.aazv.org/?page=IDM2013>. Accessed 13 August 2014.

### Presentations

Olin S, J Bartges, R Jones, **D Bemis**. Diagnostic accuracy of a novel point-of-care urinary culture test in dogs. American College of Veterinary Internal Medicine Annual Forum, Seattle, WA; Jun 12–15, 2013.

Videla R, **Bemis DA**, Kania SA. Molecular characterization and antimicrobial susceptibility of canine *Staphylococcus pseudintermedius* from the United States. American Association of Immunologists Annual Meeting, Honolulu, HI; May 3–7, 2013. Abstract #1644796.

**Bemis DA**. Invited talk: Laboratory diagnosis of fungal infections: Mycology in the trenches. Comparative & Experimental Medicine and Public Health Research Symposium, Knoxville, TN; May 20, 2013.

**Bemis DA**. Invited talk: Methicillin-resistant *Staphylococcus* and One Health. Tennessee One-Health Meeting, Nashville, TN; Jun 21, 2013.

Everett JB, A Odoi, SA Kania, **DA Bemis**. Poster: Comparison of oxacillin, cefoxitin and cefpodoxime disk diffusion screening tests for detection of *mecA* gene-mediated methicillin resistance in *Staphylococcus pseudintermedius* isolates from dogs. 3<sup>rd</sup> ASM/ESCMID Conference, Methicillin-Resistant Staphylococci in Animals: Veterinary and Public Health Implications, Copenhagen, Denmark; Nov 4–7, 2013.

## PUBLICATIONS & PRESENTATIONS

Miller K, K Burris, **D Bemis**. Poster: Antibiotic effect of yerba mate tea extracts on methicillin-resistant *Staphylococcus* isolates from dogs. 3<sup>rd</sup> ASM/ESCMID Conference, Methicillin-Resistant Staphylococci in Animals: Veterinary and Public Health Implications, Copenhagen, Denmark; Nov 4-7, 2013.

Riley MC, F Hartmann, **D Bemis**, S Kania. Poster: Complete genome sequence of the methicillin-resistant pathogen *Staphylococcus pseudintermedius* NA 45. 3<sup>rd</sup> ASM/ESCMID Conference, Methicillin-Resistant Staphylococci in Animals: Veterinary and Public Health Implications, Copenhagen, Denmark; Nov 4-7, 2013.

### Marc Caldwell

*DVM, Auburn University*

#### Presentation

Dhar M, H Eklhenany, A Lafont, **M Caldwell**, N Neilsen, L Amelse, A Biris, D Anderson. Graphene-based nanocomposite scaffolds for bone tissue engineering. North American Veterinary Regenerative Medicine Association, Atlanta, GA; 2013.

### Maria Cekanova

*MS, Biology and Chemistry, University of Pavol Jozef Safarik (Slovakia)*

*RNDr, Molecular Biology, University of Pavol Jozef Safarik*

*PhD, Genetics, University of Pavol Jozef Safarik*

#### Publications

**Cekanova M**, Bilheux HZ, Rathore K, Bilheux JC, Walker L, Donnell R, Legendre AM. Neutron radiography with combine computed tomography: a novel tool for cancer diagnosis and imaging. *Journal of Nuclear Medicine* 2013;54(Supplement 1):5-6.

Siriwardhana N, Kalupahana NS, **Cekanova M**, Lemieux M, Greer B, Moustaid-Moussa N. Modulation of adipose tissue inflammation by bioactive food compounds. *Journal of Nutritional Biochemistry* 2013;24:613-623.

**Cekanova M**, Uddin MJ, Bartges JW, Callens A, Rathore K, Legendre AM, Wright L, Carters A, Marnett LJ. Molecular imaging of COX-2 in K9TCC in vitro and in vivo. *Cancer Prevention Research (Phila)* 2013;6:466-476.

#### Presentations

**Cekanova M**, Bilheux H, Rathore K, Bilheux J-C, Walker L, Donnell R, Legendre AM. Neutron radiography combined with neutron computed tomography: A novel tool for cancer diagnosis and imaging. American Association for Cancer Research/Society of Nuclear Medicine conference, San Diego, CA; Feb 27-Mar 2 2013.

**Cekanova M**, Uddin JM, Rathore K, Galyon G, Bartges J, Callens A, Legendre A, Marnett L. Lighting

## PUBLICATIONS & PRESENTATIONS

up COX-2-expressed carcinomas by fluorocoxib A. Comparative & Experimental Medicine and Public Health Research Symposium, Knoxville, TN; May 20–21, 2013.

**Cekanova M**, Bilheux H, Rathore K, Bilheux J-C, Walker L, Donnell R, Legendre AM. Neutron radiography and neutron computed tomography: Novel imaging technologies for detection of cancers. Comparative & Experimental Medicine and Public Health Research Symposium, Knoxville, TN; May 20–21, 2013.

Rathore K, **Cekanova M**. Characterization of four new canine transitional cell carcinoma cell lines. Comparative & Experimental Medicine and Public Health Research Symposium, Knoxville, TN; May 20–21, 2013.

Rathore K, Galyon G, **Cekanova M**. Effects of environmental carcinogens on canine adipose tissue-derived mesenchymal stem cells. Comparative & Experimental Medicine and Public Health Research Symposium, Knoxville, TN; May 20–21, 2013.

**Cekanova M**, Bilheux H, Rathore K, Bilheux J-C, Donnell R. Neutrons reveal 2D and 3D structure of breast cancer. 6th Annual World Molecular Imaging Conference, Savannah, GA; Sept 18–21, 2013.

**Cekanova M**, Uddin JM, Bartges J, Callens A, Rathore K, Legendre A, Marnett L. Fluorocoxib A uptake by COX-2-expressing cancers. 6th Annual World Molecular Imaging Conference. Savannah, GA; Sept 18–21, 2013.

Rathore K, **Cekanova M**. Poster: Effects of environmental carcinogen, benzo(a)pyrene, on canine adipose-derived mesenchymal stem cells. World Stem Cell Summit, San Diego, CA; Dec 4–6, 2013.

**Cekanova M**. Help them, help us [science seminar]. Maryville College, Maryville, TN; Apr 16, 2013.

**Cekanova M**. Primary cancer cells and personalized cancer treatment. University of Tennessee Small Animal Clinical Sciences Department, Oncology seminar for residents; May 20, 2013.

**Cekanova M**. Invited seminar: Fluorocoxib A lights up the COX-2-expressing cancers: Novel role of NSAIDs as imaging agents. University of Tennessee Graduate School of Medicine; Nov 19, 2013.

**Cekanova M**. Invited seminar: Fluorocoxib A detects head and neck carcinoma: The path of its translation to clinic. Clinical Thoracic Conference at University of Tennessee Graduate School of Medicine, Knoxville TN; Dec 12, 2013.

## Mei-Zhen Cui

*MS, Biochemistry, Jilin University (China)*

*PhD, Molecular Biology, Tokyo Institute of Technology (Japan)*

### Publications

Shi J, Dong Y, **Cui M-Z**, Xu X. Lysophosphatidic acid induces increased BACE1 expression and Abeta formation. *Biochimica et Biophysica Acta-Molecular Basis of Disease* 2013;1832:29–38.

Li T, Zeng L, Gao W, **Cui M-Z**, Fu X, Xu X. PSAP induces a unique Apaf-1 and Smac-dependent mitochondrial apoptotic pathway independent of Bcl-2 family proteins. *Biochimica et Biophysica Acta-Molecular Basis of Disease* 2013;1832:453–474.



# PUBLICATIONS & PRESENTATIONS

## Presentations

**Cui M-Z.** Selected presentation: The novel role of the matricellular protein Cyr61 in the extracellular matrix bridging LPA and integrin signaling pathways, leading to smooth muscle cell migration. Annual Conference of Arteriosclerosis, Thrombosis and Vascular Biology, Lake Buena Vista, FL; May 1-3, 2013.

**Cui M-Z.** Selected presentation: *De novo* matricellular protein Cyr61 bridges LPA/GPCR pathway with the integrin pathway leading to LPA-induced cell migration. FASEB Conference: Matricellular Proteins in Development, Health, and Disease, Saxtons River, VT; Jul 28-Aug 2, 2013.

**Cui M-Z.** Invited talk: Lipids in vascular disease. Life Sciences Institute, Jilin University, Changchun, China; Sept 23, 2013.

**Cui M-Z,** Wu DD, Zhang F, Hao F, Xu X. The novel role of the matricellular protein Cyr61 in bridging LPA and integrin signaling pathways leading to cell migration. Experimental Biology Meeting, Boston, MA; Apr 19-23, 2013.

Hao F, Zhang F, Xu K, Xu X, **Cui M-Z.** Protein kinase D2 mediates LPA-induced tissue factor expression and activity through the MAPK pathway in mouse aortic smooth muscle cells. Arteriosclerosis, Thrombosis and Vascular Biology Annual Conference 2013, Lake Buena Vista, FL; May 1-3, 2013. P112.

Wu DD, Zhang F, Hao F, Xu X, **Cui M-Z.** The novel role of the matricellular protein Cyr61 in the extracellular matrix bridging LPA and integrin signaling pathways leading to smooth muscle cell migration [Best Science Abstracts section]. American Heart Association Scientific Session, Dallas, TX; Nov 18, 2013.

Zeng L, Zhang F, Hu C, Ting L, **Cui M-Z,** Xu X. Flip is a novel substrate of gamma-secretase and mediates presenilin-1 apoptosis. Comparative & Experimental Medicine and Public Health Research Symposium, Knoxville, TN; May 2013.

Hu C, Ting L, Zeng, L, **Cui M-Z,** Xu X. Role of each component of gamma secretase in APP processing. Comparative & Experimental Medicine and Public Health Research Symposium, Knoxville, TN; May 2013.

Zhang F, Wu DD, Hao F, Chun J, Xu X, **Cui M-Z.** Matricellular protein Cyr61 bridges lysophosphatidic acid and integrin pathways leading to cell migration. Comparative & Experimental Medicine and Public Health Research Symposium; Knoxville, TN, May 2013.

## Madhu Dhar

*MS, Biochemistry, University of Poona*  
*PhD, Chemistry, University of Poona (India)*

### Publication

P Favi, R Benson, N Neilsen, R Hammonds, C Bates, C Stephens, **M Dhar.** Cell proliferation, viability, and *in vitro* differentiation of equine-derived mesenchymal stem cells seeded on bacterial cellulose hydrogel scaffolds. *Materials Science and Engineering, C: Materials for Biological Application* 2013;33:1935-1944.

# PUBLICATIONS & PRESENTATIONS

## Presentations

**M Dhar**, H Atef, M Caldwell, A Biris, D Anderson. Graphene-based nanocomposite scaffolds for bone tissue engineering. Joint Conference of Tissue Engineering International and Regenerative Medicine Society and North American Veterinary Regenerative Medicine Association, Atlanta, GA; Nov 10-13, 2013.

**M Dhar**. Regenerative medicine in large animal models. Focus area meeting of Biomaterials and Regenerative Medicine, Institute of Biomedical Engineering, University of Tennessee, Knoxville, TN; Oct 31, 2013.

**M Dhar**, J Carter-Arnold, N Neilsen, L Amelse, et al. Lab-bench to stall-side: Molecular, cellular and clinical principles of equine regenerative medicine. World Congress on Regenerative Medicine, Leipzig, Germany; Oct 23-25, 2013.

P Favi, R Benson, N Neilsen, **M Dhar**. Engineering biodegradable microporous bacterial cellulose scaffolds and its biomimetic composites for bone and cartilage tissue regeneration. Comparative & Experimental Medicine and Public Health Research Symposium, Knoxville TN; May 20-21, 2013. [Best student presentation award.]

P Favi, **M Dhar**, N Neilsen, C Ehinger, R Benson. Designing biodegradable microporous bacterial cellulose scaffolds and its biomimetic composites for bone and cartilage tissue regeneration. Experimental Biology 2013, Boston, MA; Apr 20-24, 2013.

P Favi, R Benson, N Neilsen, C Ehinger, **M Dhar**. Novel biodegradable microporous bacterial cellulose scaffolds engineered for bone and cartilage tissue regeneration. Annual Meeting and Exposition of the Society of Biomaterials 2013, Boston MA; Apr 10-13, 2013.

## Stephen Kania

*MS, Veterinary Infectious Diseases, Washington State University*

*PhD, Veterinary Infectious Diseases, University of Florida*

## Publications

SM Solyman, CC Black, B Duim, V Perreten, E van Duijkeren, JA Wagenaar, LC Eberlein, LN Sadeghi, DA Bemis, **SA Kania**. Multilocus sequence typing (MLST) for characterization of *Staphylococcus pseudintermedius*. *Journal of Clinical Microbiology* 2013;51:306-310

JS Lankton, A Chapman, EC Ramsay, **SA Kania**, KM Newkirk. Preputial demodex species in big brown bats (*Eptesicus fuscus*) in eastern Tennessee. *Journal of Zoo and Wildlife Medicine* 2013;44:124-129.

RP Wilkes, DA Ward, KM Newkirk, JK Adams, **SA Kania**. Evaluation of topical delivery methods for the introduction of siRNAs into feline corneal cells in vivo. *American Journal of Veterinary Research* 2013;74:243-247.

Moodley A, Riley MC, **Kania SA**, Guardabassi L. Genome sequence of *Staphylococcus pseudintermedius* strain E140, an ST71 European-associated methicillin-resistant isolate. *Genome Announcements* 1(2):e0020712.

## PUBLICATIONS & PRESENTATIONS

Frank LA, **Kania SA**, Chung K, Brahmbhatt R. A molecular technique for the detection and differentiation of *Demodex* mites on cats. *Veterinary Dermatology* 2013;24:367–369.

Milosevic MA, Frank LA, Brahmbhatt RA, **Kania SA**. PCR amplification and DNA sequencing of *Demodex injai* from otic secretions of a dog. *Veterinary Dermatology* 2013;24:286–e66.

### Presentations

M Balachandran, D Bemis, **S Kania**. Fc-Mediated binding of canine immunoglobulin G to protein A on the surface of *Staphylococcus pseudintermedius*. Comparative & Experimental Medicine and Public Health Research Symposium, Knoxville, TN; May 20–21, 2013.

MC Riley, DA Bemis, **SA Kania**. Use of whole genome sequencing in the discovery, identification and functional characterization of a novel linear plasmid in a clinical isolate of methicillin-resistant *Staphylococcus pseudintermedius*. Comparative & Experimental Medicine and Public Health Research Symposium, Knoxville, TN; May 20–21, 2013.

E Anis, R Penrose-Wilkes, **S Kania**, A Legendre, M Kennedy. siRNA Combinations inhibit feline coronavirus replication and expression in cell culture. Comparative & Experimental Medicine and Public Health Research Symposium, Knoxville, TN, May 20–21, 2013.

**SA Kania**. Emergence of new methicillin-resistant *staphylococcus pseudintermedius* clones, Comparative and Experimental Medicine Seminar Series, University of Tennessee, Knoxville, TN, Oct 28, 2013.

**SA Kania**. Flow cytometry to detect surface-bound immunoglobulins. December Conference, University of Tennessee, Knoxville, TN, Dec 5, 2013.

R Videla, C Lanzas, SM Solyman, AM Worron, DA Bemis, **SA Kania**. Molecular characterization and antimicrobial susceptibility of canine *Staphylococcus pseudintermedius* isolates from the United States. American Association of Immunologists, Honolulu, Hawaii, May 3–7, 2013.

**Kania SA**. Invited speaker: Emergence of new methicillin-resistant *Staphylococcus pseudintermedius* clones. 3rd ASM-ESCMID Conference on Methicillin-resistant Staphylococci in Animals: Veterinary and Public Health Implications, Copenhagen, Denmark, Nov 5, 2013.

## Cristina Lanzas

*DVM, Universitat Autònoma de Barcelona (Spain)*  
*PhD, MS, Animal Sciences, Cornell University*

### Publications

Chen S, Sanderson M, White B, Amrine D, **Lanzas C**. Temporal-spatial heterogeneity in animal-environment contact: implications for the exposure and transmission of pathogens. *Nature Scientific Reports*, 2013;3:3112.

Magombedze G, Ngonghala C, **Lanzas C**. Evaluation of the “Iceberg phenomenon” in Johne’s disease through mathematical modelling. *PLoS ONE* 2013;8:e76636.

## PUBLICATIONS & PRESENTATIONS

Volkova VV, Lu Z, **Lanzas C**, Scott HM, Gröhn YT. Modelling dynamics of plasmid-gene mediated antimicrobial resistance in enteric bacteria using stochastic differential equations. *Nature Scientific Reports* 2013;3:2463

Volkova VV, Lu Z, **Lanzas C**, Gröhn YT. Evaluating targets for control of plasmid-mediated antimicrobial resistance in enteric commensals of beef cattle: Modeling approach. *Epidemiology and Infection* 2013;141:2294–2312

Chen S, Sanderson M, **Lanzas C**. Investigating effects of between- and within- host variability on *Escherichia coli* O157 shedding pattern and transmission. *Preventive Veterinary Medicine*. 2013;109:47–57

### Presentations

Ayscue P, **Lanzas C**, Gröhn YT. Models appropriate for the study of pathogens exhibiting extra-host population dynamics. 46th Annual Society for Epidemiologic Research Meeting, Boston, MA; Jun 18–21, 2013.

Chen S, Sanderson M, White B, Amrine D, **Lanzas C**. Temporal-spatial heterogeneity in animal-environment contact: implications for the exposure and transmission of pathogens. Ecology and Evolution of Infectious Disease, State College, PA; May 20–23, 2013.

**Lanzas C**. Introduction to population wildlife disease modeling. 62nd International Conference of the Wildlife Disease Association, Knoxville, TN; Jul 28, 2013.

## Amy K. LeBlanc

*DVM, Michigan State University*

### Publications

**LeBlanc AK**, Naik S, Galyon G, Jenks N, Steele M, Peng KW, Federspiel MJ, Donnell R, Russell S. Safety studies on intravenous administration of oncolytic recombinant vesicular stomatitis virus in purpose-bred beagle dogs. *Human Gene Therapy Clinical Development* 2013;24:174–181.

Hamill JJ, Sunderland JJ, **LeBlanc AK**, Kojima CJ, Wall JS, Martin EB. Evaluation of CT-based lean-body SUV. *Medical Physics* 2013;40:092504.

Stout D, Berr SS, **LeBlanc A**, Kalen JD, Osborne D, Price J, Schiffer W, Kuntner C, Wall J. Guidance for methods descriptions used in preclinical imaging papers. *Molecular Imaging* 2013;12:1–15.

Jones MP, Morandi F, Wall JS, Long MJ, Stuckey AC, **LeBlanc AK**. Distribution of 2-deoxy-2-[fluorine 18] fluoro-D-glucose in the coelom of healthy bald eagles (*Haliaeetus leucocephalus*). *American Journal of Veterinary Research* 2013;74:426–432.

Rowe JA, Morandi F, Wall JS, Akula M, Kennel SJ, Martin EB, Galyon GD, Long MJ, Stuckey AC, **LeBlanc AK**. Whole-body biodistribution of 3'-deoxy-3'-[<sup>18</sup>F]fluorothymidine (<sup>18</sup>FLT) in healthy adult cats. *Veterinary Radiology and Ultrasound* 2013;54:299–306.



# PUBLICATIONS & PRESENTATIONS

## Presentations

**LeBlanc AK**, McKenzie MO, Lyles DS. Poster: In vitro cytotoxicity of oncolytic vesicular stomatitis virus (VSV) in 4 canine transitional cell carcinoma cell lines. Veterinary Cancer Society Annual Meeting, Minneapolis, MN; Oct 18–21, 2013.

**LeBlanc AK**, Naik S, Peng KW, Federspiel MJ, Galyon GD, LeBlanc CJ, Donnell R, Russell SJ. Safety studies on intravenous administration of oncolytic vesicular stomatitis virus (VSV) expressing interferon-beta and the sodium-iodide symporter protein (NIS) in purpose-bred beagle dogs. Veterinary Cancer Society Annual Meeting, Minneapolis, MN; Oct 18–21, 2013.

Osborne D, Morandi F, **LeBlanc AK**, Wall JS, Williams L. Kinetic analysis of  $^{18}\text{F}$ FDG in normal dog brain: Preliminary review for potential use as a human model. World Molecular Imaging Congress, Savannah, GA; Sept 2013.

Akula M, Collier L, **LeBlanc A**, Stuckey A, Kennel S, Wall J, Kabalka G. Automated synthesis of [ $^{18}\text{F}$ ] FTHA and its use in PET/CT imaging studies in domestic cats. 20th International Symposium on Radiopharmaceutical Sciences, Jeju, South Korea; May 12–17, 2013.

**LeBlanc AK**. Oncolytic virotherapy in dogs: an example of translational oncology research at the University of Tennessee. American Association of Laboratory Animal Science Appalachian Branch summer meeting, Knoxville, TN; Aug 16, 2013.

**LeBlanc AK**. Featured speaker: University of Tennessee Alumni Summer College, Knoxville, TN; Jul 29, 2013.

## Barry T. Rouse

*DSc, Science, University of Bristol (England)*

*PhD, Immunology, University of Guelph (Canada)*

*MS, Virology, University of Guelph*

## Publications

Veiga-Parga T, Sehrawat S, **Rouse BT**. Role of regulatory T cells during virus infection. *Immunological Reviews* 2013;255:182–196.

Rajasagi NK, Reddy PB, Mulik S, Gjorstrup P, **Rouse BT**. Neuroprotectin D1 reduces the severity of herpes simplex virus-induced corneal immunopathology. *Investigative Ophthalmology and Visual Science* 2013;54:6269–6279.

Veiga-Parga T, Giménez F, Mulik S, Chiang EY, Grogan JL, **Rouse BT**. Controlling herpetic stromal keratitis by modulating lymphotoxin-alpha-mediated inflammatory pathways. *Microbes and Infection* 2013;15:677–687.

Mulik S, Bhela S, **Rouse BT**. Potential function of miRNAs in herpetic stromal keratitis. *Investigative Ophthalmology and Visual Science* 2013;54:563–573.

Giménez F, Suryawanshi A, **Rouse BT**. Pathogenesis of herpes stromal keratitis – a focus on corneal neovascularization. *Progress in Retinal and Eye Research* 2013;33:1–9.

# PUBLICATIONS & PRESENTATIONS

## Presentations

**Rouse BT.** Invited seminar: Some critical events in the pathogenesis of herpetic stromal keratitis (HSK). University of Pittsburgh, Pittsburgh, PA; Jan 23, 2013.

**Rouse BT.** Invited seminar: Immunity or tissue damage to viral infections – Some factors affecting the outcome. Virginia Tech University, Blacksburg, VA; Jan 25, 2013.

**Rouse BT.** Invited seminar. Fred Hutchinson Cancer Center, Seattle, WA; May 6, 2013.

**Rouse BT.** Invited seminar. Oregon Health Sciences Primary Center, Portland, OR; May 20, 2013.

**Rouse BT.** Invited seminar. Oregon State University, Corvallis, OR; May 22, 2013.

**Rouse BT.** Invited seminar. National Institutes of Health, Bethesda, MD; Jun 17, 2013.

**Rouse BT.** Seminar. South China University of Technology; Guangzhou, Guangdong, China; Jun 26, 2013.

Jimenez F, **Rouse BT.** The role of NLRP3 inflammasome on the pathogenesis of herpetic stromal keratitis. Comparative & Experimental Medicine and Public Health Research Symposium, Knoxville, TN, May 2013.

Bhela S, **Rouse BT.** Role of miR-155 in the pathogenesis of herpetic stromal keratitis. Comparative & Experimental Medicine and Public Health Research Symposium, Knoxville, TN, May 2013.

## Hildegard Schuller

*DVM equivalent, Justus Liebig University (Germany)*

*PhD equivalent, Veterinary Pathology, University of Veterinary Medicine Hannover (Germany)*

## Publications

Banerjee J, Al-Wadei HAN, **Schuller HM.** Chronic nicotine inhibits the therapeutic effects of gemcitabine on pancreatic cancer in vitro and in mouse xenografts. *European Journal of Cancer* 2013;49:1152–1158.

Al-Wadei MH, Al-Wadei HAN, **Schuller HM.** Gamma-aminobutyric acid (GABA) prevents the induction of nicotinic receptor-regulated signaling by chronic ethanol in pancreatic cancer cells and normal duct epithelia. *Cancer Prevention Research* 2013;6:139–148.

**Schuller HM.** Effects of tobacco constituents and psychological stress on the beta-adrenergic regulation of non-small cell lung cancer and pancreatic cancer: implications for intervention. (Invited review). *Cancer Biomarkers* 2013;13:133–144.

## Presentations

Papu John AMS, Banerjee J, **Schuller HM.** Regulation of urothelial bladder cancer by nicotine and stress neurotransmitters. Comparative & Experimental Medicine and Public Health Research Symposium, Knoxville, TN, May 2013.

# PUBLICATIONS & PRESENTATIONS

Banerjee J, Al-Wadei HAN, Al-Wadei MH, Dagnon K, **Schuller HM**. Nicotine-induced gemcitabine resistance is reversed by gamma-aminobutyric acid but enhanced by baclofen in pancreatic cancer xenografts and pancreatic cancer cells in vitro. Comparative & Experimental Medicine and Public Health Research Symposium, Knoxville, TN, May 2013.

## Katherine Tolbert

*DVM, University of Georgia*

*PhD, Comparative Biomedical Sciences, North Carolina State University*

### Publication

**Tolbert MK**, Stauffer SH, Gookin JL. Feline *Tritrichomonas foetus* adhere to intestinal epithelium by receptor-ligand-dependent mechanisms. *Veterinary Parasitology* 2013;192:75–82.

### Presentations

**Tolbert MK**, Stauffer SH, Gookin JL. Poster: Serine and cysteine proteases of feline *T. foetus* promote survival and adhesion to intestinal epithelial cells. 37<sup>th</sup> Annual Forum of the American College of Veterinary Internal Medicine, Seattle, WA; Jun 2013.

**Tolbert MK**, Stauffer SH, Gookin JL. Poster: Cysteine proteases of the enteric trichomonad *Tritrichomonas foetus* mediate adhesion to intestinal epithelial cells and enterocyte apoptosis. American Gastroenterology Association meeting, Orlando, FL; May 2013.

**Tolbert MK**, Stauffer SH, Gookin JL. Cysteine proteases of feline *Tritrichomonas foetus* mediate adhesion-dependent cytotoxicity to intestinal epithelial cells. Comparative & Experimental Medicine and Public Health Research Symposium, Knoxville, TN; May 2013.

**Tolbert MK**. Feline trichomonosis: A rapidly emerging cause of feline diarrhea. December Continuing Education Series, University of Tennessee, College of Veterinary Medicine, Knoxville, TN; Dec 2013.

## Hwa-Chain Robert Wang

*BVM (DVM equivalent), National Chung-Hsing University*

*MS, Veterinary Virology/Immunology, Auburn University*

*PhD, Oncogene/Molecular Biology/Microbiology, University of Virginia Health Science Center*

### Publications

Rathore K, **Wang HC**. Mesenchymal and stem-like properties targeted in suppression of chronically-induced breast cell carcinogenesis. *Cancer Letters* 2013;333:113–123.

Choudhary S, Sood S, **Wang HC**. Synergistic induction of cancer cell death and reduction of clonogenic resistance by cisplatin and FK228. *Biochemical and Biophysical Research Communication* 2013;436:325–330.

Sood S, Choudhary S, **Wang HC**. Induction of human breast cell carcinogenesis by triclocarban and intervention by curcumin. *Biochemical and Biophysical Research Communication* 2013;438:600–606.

## PUBLICATIONS & PRESENTATIONS

**Wang HC.** Breast cell carcinogenesis model for intervention. *Adaptive Medicine* 5:106–113.

### Presentations

S Choudhary, S Sood, L Pluchino, **H-CR Wang.** FK228 and cisplatin synergistically induce cell death and reduce clonogenic resistance in human bladder cancer cells. Comparative & Experimental Medicine and Public Health Research Symposium, Knoxville, TN; May 20–21, 2013. Abstract 60.

LA Pluchino, S Choudhary, S Sood, **H-CR Wang.** Acquisition of carcinogenic properties in human breast epithelial cells induced by sequential exposure versus co-exposure to environmental carcinogens. Comparative and Experimental Medicine & Public Health Research Symposium, Knoxville, TN; May 20–21, 2013. Abstract 61.

S Sood, S Choudhary, L Pluchino, **H-CR Wang.** Curcumin in the intervention of trichloro-carban-induced human breast cell carcinogenesis. Comparative & Experimental Medicine and Public Health Research Symposium, Knoxville, TN; May 20–21, 2013. Abstract 62.

LA Pluchino, **H-CR Wang.** Role of nicotine-derived nitrosamine ketone and benzo[a]pyrene on 2-amino-1-methyl-6-phenylimidazo[4,5-b]pyridine-induced breast cell carcinogenesis. University of Tennessee/Oak Ridge National Laboratory Graduate School of Genome Science & Technology/Biochemistry and Cellular and Molecular Biology Annual Retreat, Knoxville, TN; Mar 1, 2013. Poster 19.

S Choudhary, S Sood, **H-CR Wang.** Intervention of chronically-induced human breast cell carcinogenesis. 2013 Annual American Association for Cancer Research Meeting, Washington, DC; Apr 9, 2013. Poster 2581.

S Sood, S Choudhary, **H-CR Wang.** Intervention of human breast cell carcinogenesis chronically induced by trichlorocarban. 2013 Annual American Association for Cancer Research Meeting, Washington, DC; Apr 9, 2013. Poster 3706.

**H-CR Wang.** Invited speaker: Intervention of breast cell carcinogenesis. Veterans General Hospital Medical Research Institute, Taipei, Taiwan; Sept 30, 2013.

**H-CR Wang.** Invited speaker: Intervention of breast cell carcinogenesis. Chang Gung Memorial Hospital, TaoYuan, Taiwan; Oct 1, 2013.

**H-CR Wang.** Invited speaker: Intervention of breast cell carcinogenesis. Chang Gung University, TaoYuan, Taiwan; Oct 1, 2013.

**H-CR Wang.** Invited speaker: Intervention of cellular carcinogenesis. National Health Research Institutes, Zhunan, Taiwan; Oct 3, 2013.

**H-CR Wang.** Invited speaker: Biomedical research and graduate studies. National Chung Hsing University Department of Life Sciences, Taichung, Taiwan; Oct 4, 2013.

**H-CR Wang.** Invited keynote speaker: Breast cell carcinogenesis and intervention. 3rd Symposium on Adaptive Medicine and Adaptability across the Strait, China Medical University, Taichung City, Taiwan; Oct 5, 2013.

**H-CR Wang.** Invited speaker: Model of breast cell carcinogenesis for intervention. North West Agricultural and Forestry University, College of Animal Science and Veterinary Medicine, Yangling City, Shaanxi Province, China; Oct 9, 2013.

**H-CR Wang.** Invited speaker: Biomedical research and graduate studies. North West Agricultural and Forestry University, Innovation Experimental College, Yangling, Shaanxi Province, China; Oct 10, 2013.



## PUBLICATIONS & PRESENTATIONS

**H-CR Wang.** Invited speaker: Cellular carcinogenesis and intervention. Xinjiang Academy of Animal Science, Institute of Veterinary Medicine, Urumqi, Xinjiang Province, China; Dec 4, 2013.

**H-CR Wang.** Invited speaker: Cellular carcinogenesis and intervention. Xinjiang Agricultural University, College of Veterinary Medicine, Urumqi, Xinjiang Province, China; Dec 7, 2013.

### Xuemin Xu

*MS, Biochemistry, Tokyo Institute of Technology (Japan)*

*PhD, Molecular Biology, Tokyo Institute of Technology*

#### Publications

Li T, Zeng L, Gao W, Cui M-Z, Fu X, **Xu X**. PSAP induces a unique Apaf-1 and Smac-dependent mitochondrial apoptotic pathway independent of Bcl-2 family proteins. *Biochimica et Biophysica Acta – Molecular Basis of Disease* 2013;1832:453–474.

Shi J, Dong Y, Cui M-Z, **Xu X**. Lysophosphatidic acid induces increased BACE1 expression and Abeta formation. *Biochimica et Biophysica Acta—Molecular Basis of Disease* 2013; 1832:29–38.

#### Presentations

**Xu X.** Invited talk: Molecular mechanism of neurodegeneration in Alzheimer's disease. Jilin University, Changchun, China; Sept, 3, 2013.

Cui M-Z, Wu DD, Zhang F, Hao F, **Xu X**. The novel role of the matricellular protein Cyr61 in bridging LPA and integrin signaling pathways leading to cell migration. Experimental Biology Meeting, Boston, MA, Apr 19–23, 2013.

Hao F, Zhang F, Xu K, **Xu X**, Cui M-Z. Protein kinase D2 mediates LPA-induced tissue factor expression and activity through the MAPK pathway in mouse aortic smooth muscle cells. Arteriosclerosis, Thrombosis and Vascular Biology Annual Conference 2013, Lake Buena Vista, FL, May 1–3, 2013. P112.

Wu DD, Zhang F, Hao F, **Xu X**, Cui M-Z. The novel role of the matricellular protein Cyr61 in the extracellular matrix bridging LPA and integrin signaling pathways leading to smooth muscle cell migration [Best Science Abstracts section]. American Heart Association Scientific Session, Dallas, TX, Nov 18, 2013.

Zeng L, Zhang F, Hu C, Ting L, Cui M-Z, **Xu X**. Flip is a novel substrate of gamma-secretase and mediates presenilin-1 apoptosis. Comparative & Experimental Medicine and Public Health Research Symposium, Knoxville, TN, May 2013.

Hu C, Ting L, Zeng L, Cui M-Z, **Xu X**. Role of each component of gamma secretase in APP processing. Comparative & Experimental Medicine and Public Health Research Symposium, Knoxville, TN, May 2013.

Zhang F, Wu DD, Hao F, Chun J, **Xu X**, Cui M-Z. Matricellular protein Cyr61 bridges lysophosphatidic acid and integrin pathways leading to cell migration. Comparative & Experimental Medicine and Public Health Research Symposium, Knoxville, TN, May 2013.

## Research Funded Externally – Detail

Investigator	Project Title	Funding Agency	Project Period	2014 Receipts	2014 Expenditures
<b>Almeida, Raul</b>	Southeast Quality Milk Initiative: Controlling mastitis and improving milk quality	USDA Agriculture and Food Research Initiative	02/01/13-01/31/15	\$600,000	\$385,712
	<i>Streptococcus uberis</i> surface proteins as vaccine candidates for the control of <i>Streptococcus uberis</i> mastitis in dairy cows	Private industry	01/01/14-12/31/14	\$291,675	\$108,170
<b>Baek, Seung Joon</b>	Prevention of colorectal cancer by tolfenamic acid	National Institutes of Health	07/01/11-06/30/15	\$0	\$51,012
<b>Cekanova, Maria</b>	Isolation and characterization of human primary cancer cell lines to evaluate novel therapeutic and imaging agents in vitro	Physician's Medical Education and Research Foundation	02/06/14-02/05/15	\$5,000	\$181
	Detection of COX-2 expressing canine tumors by new optical imaging tracer, fluorocoxib A	Vanderbilt University Medical Center	11/01/11-08/31/13	\$0	\$0
	Neutron radiography and neutron computed tomography of primary and metastatic cancers	Oak Ridge National Laboratory (ORNL)/ Spallation Neutron Source/U.S. Department of Energy (DOE)	10/31/13-06/30/14	\$238,000	Beam time only; no monetary expenditures
<b>Cui, Mei-Zhen</b>	Novel mechanism mediating LPA-induced smooth muscle cell and vascular responses	National Institutes of Health	06/15/11-05/31/15	\$357,700	\$311,808
<b>Dhar, Madhu</b>	Assessment of cytotoxicity of SutureSeal on adult mesenchymal stem cells	Medicus Biosciences	06/05/14-06/04/15	\$5,500	\$0
	Testing the efficacy of Nell1 protein in wound healing using an equine model	NellOne Therapeutics	03/20/14-01/19/15	\$69,192	\$32,742
	Characterization of the elution profile of full-length human Nell1 protein from scaffolds	NellOne Therapeutics	12/15/13-06/15/14	\$10,880	\$10,880
	Egyptian government graduate student sponsorship	Egyptian Cultural and Educational Bureau	10/01/13-09/30/15	\$21,500	\$9,210

## Research Funded Externally – Detail

Investigator	Project Title	Funding Agency	Project Period	2014 Receipts	2014 Expenditures
<b>Kania, Stephen</b>	Detection of dermatophytosis in cats by PCR	Winn Feline Foundation	05/01/13-10/30/14	\$0	\$6,312
	Effectiveness of small interfering RNA (siRNA) to inhibit feline coronavirus replication	Winn Feline Foundation	01/01/12-12/31/13	\$0	\$3,718
	Veterinary student research program	Meril Limited LLC	05/01/14-09/01/14	\$5,000	\$3,000
	Veterinary student research program	Meril Limited LLC	05/01/13-09/01/13	\$0	\$8,615
<b>Lanzas, Cristina</b>	Shiga-toxigenic <i>Escherichia coli</i> (STEC) in the beef chain: Assessing and mitigating the risk by translational science, education and outreach	University of Nebraska-Lincoln	01/01/14-11/30/14	\$55,032	\$36,474
<b>LeBlanc, Amy</b>	Preclinical comparison of three indenoisoquinolines candidates in tumor-bearing dogs	Leidos Biomedical Research	04/01/14-03/13/15	\$16,294	\$8,141
	A clinical trial of VSV-cIFN $\beta$ -NIS oncolytic virotherapy for canine B cell lymphoma	Morris Animal Foundation	11/01/13-10/31/16	\$146,165	\$22,843
	Imaging properties and toxicity of selected near-IR dyes in dogs	U.S. DOE/UT-Battelle/ORNL	09/26/12-02/06/14	\$79,701	\$0
<b>Rouse, Barry</b>	T-Regulatory cells in HSV immunity and immunopathology	National Institutes of Health	02/01/12-01/31/16	\$353,735	\$331,601
	Mechanisms in herpetic keratitis	National Institutes of Health	01/01/13-12/31/16	\$469,808	\$462,573
<b>Schuller, Hildegard</b>	GABA-BR-mediated prevention of pancreatic cancer	National Institutes of Health	09/28/09-08/31/15	\$263,148	\$348,770
<b>Tolbert, Katherine</b>	Analysis of oral acid suppressants for treatment of feline acid-related disorders	Comparative Gastroenterology Society	01/28/14-01/27/15	\$8,000	\$7,122
	Cysteine proteases: Novel molecular targets for pharmacologic control of feline trichomoniasis	Morris Animal Foundation	11/01/13-10/31/14	\$46,321	\$21,376
<b>Xu, Xuemin</b>	The role of the new zeta cleavage in A $\beta$ formation	National Institutes of Health	04/01/07-03/31/14	\$0	\$25,453
	Vascular risk factors in Alzheimer's disease	American Health Assistance Foundation	04/01/09-03/31/14	\$0	\$91,702
	Role of presenilin-associated protein (PSAP) in apoptosis and A $\beta$ formation	National Institutes of Health	04/15/11-03/31/15	\$0	\$73,502
<b>Totals</b>				<b>\$3,042,651</b>	<b>\$2,360,916</b>

**Schedule 7**  
**Center of Excellence in Livestock Diseases and Human Health**  
**Actual, Proposed, and Requested Budget**

	FY 2013-14 Actuals			FY 2014-15 Proposed			FY 2015-16 Requested		
	Matching	Appropri.	Total	Matching	Appropri.	Total	Matching	Appropri.	Total
Expenditures	186,374	372,748	559,122	352,503	705,007	1,057,510	420,683	841,366	1,262,049
<b>Salaries</b>									
Faculty	0	0	0	0	0	0	0	0	0
Other Professional	45,093	90,186	135,279	56,366	112,732	169,098	59,184	118,369	177,553
Clerical/ Support	26,538	53,076	79,614	33,172	66,345	99,517	34,831	69,662	104,493
Assistantships	14,448	28,896	43,343	18,060	36,120	54,179	18,963	37,926	56,888
<b>Total Salaries</b>	<b>86,079</b>	<b>172,157</b>	<b>258,236</b>	<b>107,598</b>	<b>215,196</b>	<b>322,795</b>	<b>112,978</b>	<b>225,956</b>	<b>338,934</b>
Longevity	845	1,689	2,534	1,056	2,111	3,167	1,108	2,217	3,325
Fringe Benefits	18,177	36,355	54,532	22,722	45,443	68,165	23,858	47,716	71,573
<b>Total Personnel</b>	<b>105,101</b>	<b>210,201</b>	<b>315,302</b>	<b>131,376</b>	<b>262,751</b>	<b>394,127</b>	<b>137,944</b>	<b>275,889</b>	<b>413,833</b>
<b>Non-Personnel</b>									
Travel	9,979	19,958	29,937	19,958	39,915	59,873	24,947	49,894	74,842
Software	697	1,394	2,091	2,091	4,181	6,272	4,181	8,362	12,543
Books & Journals	0	0	0	1,167	2,333	3,500	1,313	2,626	3,939
Operat Supplies	41,924	83,849	125,773	54,405	104,811	157,216	65,507	131,014	196,520
Lab Supplies	0	0	0	41,667	83,333	125,000	52,083	104,167	156,250
Sensitive Minor Equip	570	1,140	1,710	1,710	3,420	5,130	3,420	6,840	10,260
Equipment	1,417	2,833	4,250	36,233	72,467	108,700	41,667	83,333	125,000
Maintenance	871	1,743	2,614	2,614	5,229	7,843	5,229	10,458	15,686
Scholarships	8,544	17,089	25,633	23,200	46,400	69,600	26,667	53,333	80,000
Consultants	200	400	600	600	1,200	1,800	1,200	2,400	3,600
Service & Memberships	1,136	2,271	3,407	3,407	6,814	10,221	6,814	13,628	20,442
Postage, Freight	613	1,225	1,838	1,838	3,676	5,514	3,676	7,352	11,028
Printing, Pub's, Phone	1,236	2,472	3,708	3,708	7,416	11,124	7,416	14,832	22,248
Contract Special Svcs	7,043	14,087	21,130	14,087	28,173	42,260	17,608	35,217	52,825
Other Univ Expenses	4,687	9,373	14,060	9,373	18,747	28,120	11,717	23,433	35,150
Other Expenses	2,357	4,713	7,070	7,070	14,140	21,210	9,751	19,502	27,883
<b>Total Non-Personnel</b>	<b>81,273</b>	<b>162,547</b>	<b>243,820</b>	<b>221,128</b>	<b>442,255</b>	<b>663,383</b>	<b>283,195</b>	<b>566,391</b>	<b>848,216</b>
<b>Grand Total</b>	<b>186,374</b>	<b>372,748</b>	<b>559,122</b>	<b>352,503</b>	<b>705,007</b>	<b>1,057,510</b>	<b>421,139</b>	<b>842,280</b>	<b>1,262,049</b>
<b>Revenue</b>									
New State Appropriation		523,321	523,321		510,737	510,737	0	536,279	536,279
Carryover State Appropriation		347,863	347,863		498,698	498,698		305,700	305,700
New Matching Funds	261,661		261,661	255,369		255,369	268,132		268,132
Carryover/ Prev Match Funds	173,950		173,950	248,975		248,975	151,938		151,938
<b>Total Revenue</b>	<b>435,611</b>	<b>871,184</b>	<b>1,306,795</b>	<b>504,344</b>	<b>1,009,435</b>	<b>1,513,779</b>	<b>420,070</b>	<b>841,979</b>	<b>1,262,049</b>



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