



# *lifelines*

News from the  
College of Veterinary Medicine  
at Kansas State University

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## NIH grant supports vaccine research

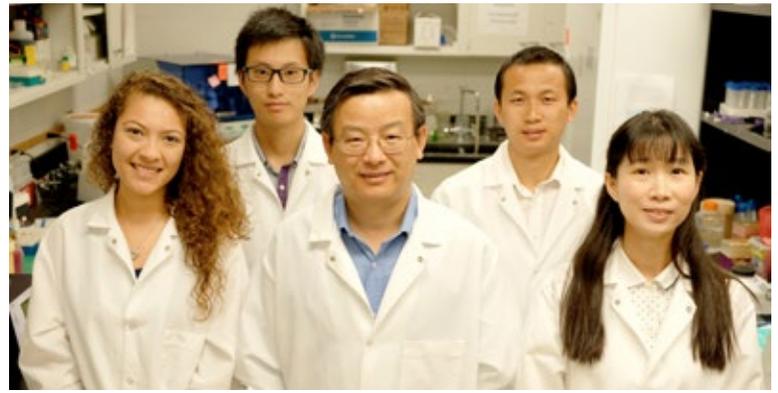
### Dr. Weiping Zhang developing safeguard against ETEC-associated diarrhea

Dr. Weiping Zhang, professor of microbiology, has been awarded a \$2.1 million National Institutes of Health R01 grant for the next five years. The grant will support the development of a vaccine to guard against *E. coli*-associated diarrhea. NIH has awarded two additional grants to Dr. Zhang in the last three years to develop vaccines against *E. coli* diarrhea.

“Diarrhea continues to be a leading cause of death in children under five years of age, and enterotoxigenic *E. coli* (ETEC) is the most common bacterial cause of children’s diarrhea,” Dr. Zhang said. “Currently, there are no available vaccines against ETEC-associated diarrhea. Whole-cell vaccine candidates have been under development, but require further improvements because they provide inadequate protection and produce unwanted adverse effects.”

“Effective vaccines for ETEC have proved to be very challenging,” said Dr. Frank Blecha, associate dean for research in the veterinary college. “Dr. Zhang’s vaccine development strategy for ETEC using multiepitope fusion antigens holds great promise for a vaccine that will limit diarrheal deaths in humans and animals.”

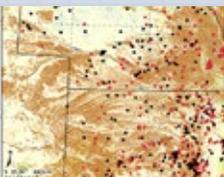
Dr. Zhang was trained as a molecular evolutionary biologist and his *E. coli* pathogenesis and vaccine research and development career began in 2003 when he studied molecular pathogenesis of individual enterotoxins produced by ETEC in diarrheal disease using gnotobiotic or germ-free piglets. By challenging gnotobiotic piglets with isogenic *E. coli* strains that express heat-labile or heat-stable toxins and analyzing clinical outcomes, he developed a gnotobiotic pig challenge model for ETEC diarrheal disease research and vaccine development.



Dr. Weiping Zhang (center) credits his team for the success in acquiring grants to support his research on *E. coli*-related vaccines. From left: Carolina Garcia, grad student; Jiachen Huan, grad student; Dr. Zhang; Dr. Qiangde Duan, postdoc; and Ti Lu, grad student. Not pictured are postdocs Drs. Rahul Nandre, Xiaosai Ruan and Mei Liu.

“Our work has focused most recently on multiepitope fusion antigens (MEFA) for the development of broadly protective ETEC vaccines,” Dr. Zhang said. “Different ETEC strains produce immunologically heterogeneous bacterial adhesins to attach host cells and colonize in small intestines, initiating ETEC diarrheal disease. With the inclusion of another adhesin multiepitope fusion antigen, then a subunit vaccine is potentially able to induce antibodies against both toxins and up to 15 prevalent ETEC adhesins, thus effectively protecting against ETEC diarrhea. This grant will allow us to continue our research and study the effectiveness of this approach.”

#### Inside this issue of *lifelines*



**Mapping rabid skunks.**

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**Do frogs host zoonotic diseases?**

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**Science To Art in Kansas City**

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## Research project puts striped skunk rabies on the map

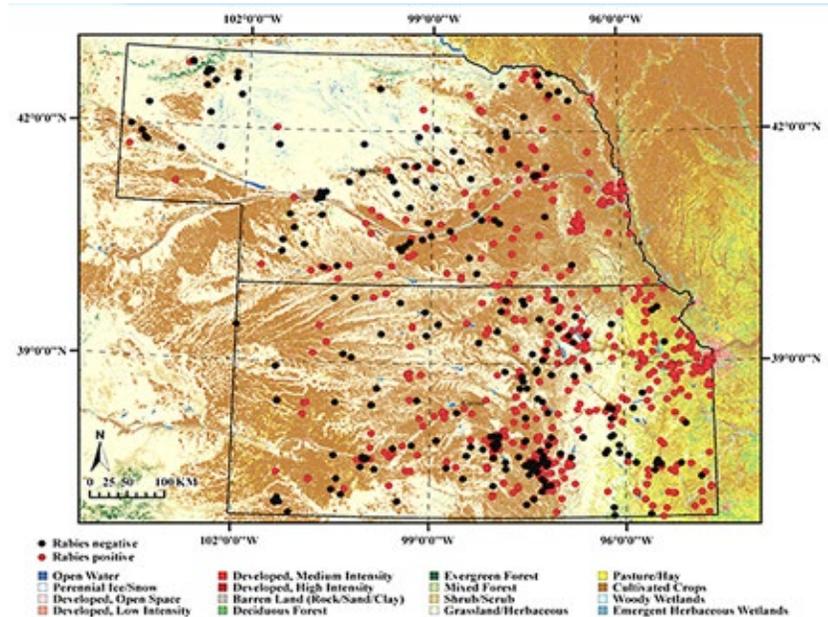
While striped skunks already have a nose-worthy reputation for being avoided, new research at the CVM emphasizes a serious health hazard these skunks pose to animals and humans: rabies.

Researchers in the Kansas State Veterinary Diagnostic Laboratory recently evaluated the spatial and spatio-temporal patterns of infection status among striped skunk cases submitted for rabies testing in the North Central Plains of the United States, including potential eco-climatological drivers of such patterns.

“These animals represent one of the most important terrestrial reservoirs of rabies virus in North America and yet the prevalence of rabies among this host is only passively monitored, and the disease remains largely unmanaged,” said Dr. Susan Moore, director of the Rabies Laboratory. “Vaccination campaigns have not efficiently targeted striped skunks. There are occasional spillovers of striped skunk viruses to other animals, including some pets that are routinely recorded in our lab.”

Dr. Ram Raghavan, a spatial epidemiologist at the diagnostic laboratory worked closely with the Rabies Laboratory on this project.

“Our findings indicate the year-to-year and spatial origins of rabies occurrences in Kansas and Nebraska are currently stable,” Dr. Raghavan said. “Certain physical environment and climatic factors play an important role in determining such temporal and spatial patterns. For example, there is a relatively higher risk of rabies transmission from striped skunks to humans who reside in developed low-intensity areas and highly fragmented landscapes,



The map above shows spatial distribution of positive (dark circles) and negative (red circles) test results for striped skunk rabies in the study region.

such as edges of woodlands and agricultural lands than in other places.”

The study, “Bayesian Spatiotemporal Pattern and Eco-Climatological Drivers of Striped Skunk Rabies in the North Central Plains,” has recently been published in PLOS Neglected Tropical Diseases. The study suggests that daytime temperature range, a climate change indicator that is decreasing at a slow but steady rate, may increase the general risk striped skunks contracting rabies.

## Dr. Ganta visits academic institutes in China for CEVBD

Dr. Roman Ganta, professor of diagnostic medicine and pathobiology and director of the Center of Excellence for Vector-Borne Diseases in the College of Veterinary Medicine, was invited to visit three academic institutes June 24-July 1 in China: the Yangzhou University College of Veterinary Medicine, the Shandong University School of Public Health, and the Beijing Institute of Microbiology and Epidemiology. Dr. Ganta lectured at the universities and also discussed research collaborations.

Yangzhou University and the Beijing Institute of Microbiology and Epidemiology expressed strong interest to work on projects of mutual interest, particularly to work on vector-borne diseases currently pursued at the center, Dr. Ganta said. Shandong University would like to send its scientists to be trained through research projects at the center.

Dr. Ganta will follow up in developing strategic collaborations with all three institutes in China.



Dr. Roman Ganta represents the Center of Excellence for Vector-Borne Diseases (CEVBD) in China.

## CVM labs study amphibians as possible zoonotic disease hosts



Three different laboratories in the CVM hopped on board for a unique study that looks at the potential role of amphibians as a vector for the spread of infectious diseases. The project was led by Dr. Yongming Sang, research associate professor of anatomy and

physiology in the College of Veterinary Medicine.

“Amphibians have a previously unknown complexity within their antimicrobial interferon system, which is highly and differentially responsive to influenza infections,” Dr. Sang explained. “This suggests the need to study the possible role of wild amphibians as overlooked reservoirs/end hosts for influenza and other zoonotic pathogenic infections. This study highlights the unique position of the amphibian interferon system in interferon evolution and its potential role in prevention of cross-species viral transmission to humans.”

Dr. Sang collaborated with Dr. Frank Blecha, associate dean for research, Dr. Wenjun Ma, associate professor of diagnostic medicine/pathobiology, and Dr. Scott McVey, Research Leader for the USDA’s Arthropod Borne Animal Disease Research Unit, whose respective research laboratories were used to help conduct the basic research. Dr. Peiyong Fong, associate professor of anatomy and physiology, contributed tissue samples from frogs that were used in the study.

## Dr. Wangemann reunites with former postdocs on speaking trip in Korea

While convening with colleagues and peers is a primary objective of scientific conferences and meetings, sometimes one gets an opportunity to reunite with former trainees at such meetings. A recent speaking trip overseas for Kansas State University’s Dr. Philine Wangemann turned into a reunion with several former postdoctoral trainees who now live and work in Korea where the biennial meeting of the Barany Society was held.

Dr. Wangemann is a university distinguished professor in the anatomy and physiology department in the College of Veterinary Medicine, who has been at Kansas State University since 1998. She is frequently collaborating with Dr. Daniel C. Marcus, who is also a university distinguished professor. Together they have mentored many postdoctoral fellows

who have trained in their laboratories and are now successful professional colleagues.

The individuals that Dr. Wangemann met in Korea included: Dr. Hyoung-Mi Kim, now assistant professor, who was a postdoctoral fellow with Dr. Wangemann from 2008 to 2011; Dr. Sung Huhn Kim, now associate professor, who was a postdoctoral fellow with Dr. Marcus from 2007 to 2009; and Dr. Jun Ho Lee, now full professor, who was a postdoctoral fellow with

## CEEZAD Receives \$2.3 Million Grant for Vaccine Research

The Center of Excellence for Emerging Zoonotic and Animal Diseases (CEEZAD) has recently received a \$2.3 million grant from the Defense Threat Reduction Agency (DTRA) to conduct research on the safety in livestock of a newly developed vaccine to protect humans against infection with the Ebola Zaire virus.



The grant, from DTRA in a collaboration with the commercial firm NewLink Genetics, includes a \$100,000 matching contribution from the state of Kansas’ NBAF Transition Funds. Kansas State University researchers will study the safety of the vaccine in swine, cattle, and horses in Kansas State University’s Biosecurity Research Institute.

The vaccine is called VSV-ZEBOV; VSV stands for Vesicular Stomatitis Virus, and ZEBOV is the acronym for the Zaire strain of Ebola virus, the deadliest strain of Ebola virus that causes Ebola disease in humans. The vaccine uses the vesicular stomatitis virus to carry a small, harmless piece of the Ebola virus that immunizes a vaccinated person. The Ebola virus is thought to be transmitted to people from an as-yet unidentified wild animal reservoir, and then spreads in the human population through human-to-human transmission. The average disease case fatality rate is around 50 percent, but has varied from 25 percent to 90 percent in various outbreaks.



*Dr. Philine Wangemann, third from left, catches up with other scientists in Korea: Drs. Sung Huhn Kim, Un Kyoung Kim, Byung Yoon Choi and Dr Chen-Chi Wu.*

Dr. Marcus from 2000 to 2002. The three are affiliated with the leading Korean Universities Yonsei and Seoul National.

“It was so much fun to get together for an alumni dinner” said Dr. Wangemann.

## Dr. Nguyen's 'Eye of the Storm' in Science To Art expo



A cancerous storm is among the nine artistic images in a new exhibition of work by regional scientists on display in Kansas City, Missouri. "Eye of the Storm" was captured by Dr. Annelise Nguyen, a researcher in the College of Veterinary Medicine at Kansas State University, through a confocal microscope and shows where cell-to-cell communication proteins occur in human breast cancer tissue.

The artwork is part of the Kansas City Area Life Sciences Institute's third annual "Science to Art" exhibition, which features intrinsic images found in biomedical research. Such images are usually only displayed on research journal covers.

"The purpose of 'Science to Art' is to provide a platform for scientists to display and describe their research through the visual arts," said Dr. Wayne O. Carter, institute president and CEO.

The images for the exhibit were submitted by scientists from Columbia, Missouri, to Manhattan, Kansas, and were selected by arts and science professionals. They were curated by the Kemper Museum.

Dr. Nguyen's artwork of a patient's tumor sample was labeled to show proteins of interest relating to cell-to-cell communication.

## CVM News Ticker



The Veterinary Health Center welcomed a new group of new residents, plus one intern, who went through orientation July 18 and 19. Left to Right: Drs. Dana White, Sabina Sheppard, Christina Chesvick, Natalie Punt (intern), Cori Youngblood, Olga Norris.



The Beef Cattle Institute Summer Scholars took their first tour as part of their summer program on July 8. Paige and Jason Pratt of Johnson Farms near Dwight, Kansas, hosted the student researchers whose projects range from food safety to mobile app development for producer decision tools.

As an introduction, The Pratt's gave a thorough background of their history in the beef cattle business and how their entire family is involved in the current operation. Students asked a variety of important questions relative to issues facing the beef industry today including antibiotic resistance and sustainability.

## VHC recognizes Dr. Hodgson for mentoring



A list of quotes on the screen behind Dr. David Hodgson tell about his impact as a mentor. Dr. Bonnie Rush presented him with the VHC's resident mentoring award.

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