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Human pathogen killing corals in the Florida Keys

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James Porter, PhD

Winter Park, Fl. and Athens, Ga.
- A research team from Rollins College in Florida and the University of Georgia has identified human sewage as the source of the coral-killing pathogen that causes white pox disease of Caribbean elkhorn coral. Once the most common coral in the Caribbean, elkhorn coral was listed for protection under the United States Endangered Species Act in 2006, largely due to white pox disease. The team's findings have just been published in the peer-reviewed open access journal PLoS ONE.

Kathryn P. Sutherland, associate professor of biology at Rollins College, and her research collaborators, Associate Professor of Environmental Health Science Erin K. Lipp and Professor of Ecology James W. Porter of the University of Georgia, have known since 2002 that the bacterium that killed coral was the same species as found in humans. "When we identified *Serratia marcescens* as the cause of white pox, we could only speculate that human waste was the source of the pathogen because the bacterium is also found in the waste of other animals," Sutherland said.

In order to determine a source for the pathogen, the research team collected and analyzed human samples from the wastewater treatment facility in Key West and samples from several other animals, such as Key deer and seagulls. While *Serratia marcescens* was found in these other animals, genetic analyses showed that only the strain from human sewage matched the strain found in white pox diseased corals on the reef. The final piece of the investigative puzzle was to show that this unique strain was pathogenic to corals.

This quarterly newsletter is dedicated to enhancing the integration of animal, human, and environmental health for the benefit of all by demonstrating One Health in practice.

<http://www.onehealthinitiative.com>

Porter-Pox Image 3587

A healthy stand of endangered elk-horn coral is found on Sombrero Reef in the Florida Keys National Marine Sanctuary. Photo credit: James W. Porter, University of Georgia.

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With funding from Florida's Mote Marine Laboratory "Protect Our Reefs" grant program, Sutherland, Lipp, and Porter conducted challenge experiments by inoculating fragments of coral with the strain found in both humans and corals to see if it would cause disease. The experiments were carried out in a laboratory in closed seawater tanks to eliminate any risk of infection to wild populations of corals.

"The strain caused disease in elkhorn coral in five days, so we now have definitive evidence that humans are a source of the pathogen that causes this devastating disease of corals," Sutherland said.

"These bacteria do not come from the ocean, they come from us," said Porter. Water-related activities in the Florida Keys generate more than \$3 billion a year for Florida and the local economy. "We are killing the goose that lays the golden egg, and we've got the smoking gun to prove it," Porter said.

Serratia marcescens is also a pathogen of humans, causing respiratory, wound and urinary tract infections, meningitis, and pneumonia. Human diseases caused by this bacterium are most often associated with hospital-acquired infec-

tions of newborn infants and immune-compromised adults. This research reveals a new disease pathway, from humans to wildlife, which is the opposite of the traditional wildlife-to-human disease transmission model. The movement of pathogens from wildlife to humans is well documented—for example, bird flu or HIV—but the movement of disease-causing microbes from humans to marine invertebrates has never been shown before. This is the first time that a human disease has been shown to cause population declines of a marine invertebrate.

"Bacteria from humans kill corals—that's the bad news," said Porter. "But the good news is that we can solve this problem with advanced wastewater treatment facilities," like one recently completed in Key West. "This problem is not like hurricanes, which we can't control. We can do something about this one," he said. The entire Florida Keys is in the process of upgrading local wastewater treatment plants, and these measures will eliminate this source of the bacterium.

The Rollins College and University of Georgia collaborative research group is currently funded by a \$2.2 million grant from the National Science Foundation to investigate the ecology of white pox disease in the Florida Keys. The five-year study will focus on mechanisms of transmission of the coral pathogen and the factors that drive the emer-

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Porter-Pox Image 3812

Porter-Pox Image 4801

The human disease serratiois is caused by the fecal coliform bacterium *Sarratia marcescens*. When it infects coral, as in this case from Key West, FL, it destroys the overlying coral tissue, revealing the dead, white limestone skeleton underneath. Photo credit: James W. Porter, University of Georgia.

Divers collect syringe samples of white pox coral disease in an attempt to identify the causes for coral decline in the Florida Keys. Photo credit: James W. Porter, University of Georgia.

variability, and patterns of human population density. "We are concerned that disease incidence or severity may increase with rising temperatures," Lipp said, "reinforcing the importance of protecting near-shore water quality in a changing climate."

Besides Sutherland, Porter, and Lipp, the study's co-authors were Sameera Shaban of Rollins College and Jessica L. Joyner of UGA. The article is available online at <http://dx.plos.org/10.1371/journal.pone.0023468>.

Dr. James Porter is a Josiah Meigs Distinguished Professor in the Odum School of Ecology at the University of Georgia.

CU-Boulder python study may have implications for human heart health

[Reprinted with permission from www.colorado.edu]

Leslie Leinwand, PhD

A surprising new University of Colorado Boulder study shows that huge amounts of fatty acids circulating in the bloodstreams of feeding pythons promote healthy heart growth, results that may have implications for treating human heart disease.

CU-Boulder Professor Leslie Leinwand and her research team found the amount of triglycerides -- the main constituent of natural fats and oils -- in the blood of Burmese pythons one day after eating increased by more than fiftyfold. Despite the massive amount of fatty acids in the python bloodstream there was no evidence of fat deposition in the heart, and the researchers also saw an increase in the activity of a key enzyme known to protect the heart from damage.

After identifying the chemical make-up of blood plasma in fed pythons, the CU-Boulder researchers injected fasting pythons with either "fed python" blood plasma or a reconstituted fatty acid mixture they developed to mimic such plasma. In both cases, the pythons showed increased heart growth and indicators of cardiac health. The team took the experiments a step further by injecting mice with either fed python plasma or the fatty acid mixture, with the same results.

"We found that a combination of fatty acids can induce beneficial heart growth in living organisms," said CU-Boulder postdoctoral researcher Cecilia

Riquelme, first author on the Science paper. "Now we are trying to understand the molecular mechanisms behind the process in hopes that the results might lead to new therapies to improve heart disease conditions in humans."

The paper is being published in the Oct. 28 issue of the journal Science. In addition to Leinwand and Riquelme, the authors include CU postdoctoral researcher Brooke Harrison, CU graduate student Jason Magida, CU undergraduate

Researchers at University of Colorado Boulder found that a combination of fatty acids can induce beneficial heart growth in living organisms.

James Porter

Heart disease: Snakes may hold the answers

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Christopher Wall, Hiberna Corp. researcher
Thomas Marr, and University of Alabama
Tuscaloosa Professor Stephen Secor.

Previous studies have shown that the hearts of Burmese pythons can grow in mass by 40 percent within 24 to 72 hours after a large meal, and that metabolism immediately after swallowing prey can shoot up by fortyfold. As big around as telephone poles, adult Burmese pythons can swallow prey as large as deer, have been known to reach a length of 27 feet, and are able to fast for up to a year with few ill effects.

There are good and bad types of heart growth, said Leinwand, who is an expert in genetic heart diseases including hypertrophic cardiomyopathy, the leading cause of sudden death in young athletes. While cardiac diseases can cause human heart muscle to thicken and decrease the size of heart chambers and heart function because the organ is working harder to pump blood, heart enlargement from exercise is beneficial.

"Well-conditioned athletes like Olympic swimmer Michael Phelps and cyclist Lance Armstrong have huge hearts," said Leinwand, a professor in the molecular, cellular, and developmental biology department and chief scientific officer of CU's Biofrontiers Institute. "But there are many people who are unable to exercise because of existing heart disease, so it would be nice to develop some kind of a treatment to promote the beneficial growth of heart cells."

Riquelme said once the CU team confirmed that something in the blood plasma of pythons was inducing positive cardiac growth, they began looking for the right "signal" by analyzing proteins, lipids, nucleic acids, and peptides present in the fed plasma. The team used a technique known as gas chromatography to analyze both fasted and fed python plasma blood, eventually identifying a highly complex composition of circulating fatty acids with distinct patterns of abundance over the course of the digestive process.

In the mouse experiments led by Harrison, the animals were hooked up to "mini-pumps" that delivered low doses of the fatty acid mixture over a period of a week. Not only did the mouse hearts show significant growth in the major part of the heart that pumps blood, the heart muscle cell size increased, there was no increase in heart fibrosis -- which makes the heart muscle more stiff and can be a sign of disease -- and there were no alterations in the liver or in the skeletal muscles, he said.

"It was remarkable that the fatty acids identified in the plasma-fed pythons could actually stimulate healthy heart growth in mice," said Harrison. The team also tested the fed python plasma and the fatty acid mixture on cultured rat heart cells, with the same positive results, Harrison said.

The CU-led team also identified the activation of signaling pathways in the cells of fed python plasma, which serve as traffic lights of sorts, said Lein-

“There are many people who are unable to exercise because of existing heart disease, so it would be nice to develop some kind of a treatment to promote the beneficial growth of heart cells.”

2010_Aerial3170.jpg

Leinwand smlr.png

The CU Biofrontiers Institute is uniquely defined by its excellent researchers and leadership, and by the scientific and geographical ecosystem that empowers their work.

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wand. "We are trying to understand how to make those signals tell individual heart cells whether they are going down a road that has pathological consequences, like disease, or beneficial consequences, like exercise," she said.

The prey of Burmese pythons can be up to 100 percent of the constricting snake's body mass, said Leinwand, who holds a Marsi-

co Endowed Chair of Excellence at CU-Boulder.

"When a python eats, something extraordinary happens. Its metabolism increases by more than fortyfold and the size of its organs increase significantly in mass by building new tissue, which is broken back down during the digestion process."

The three key fatty acids in the fed python plasma turned out to be myristic acid, palmitic acid, and palmitoleic acid. The enzyme that showed increased activity in the python hearts during feeding episodes, known as superoxide dismutase, is a well-known "cardio-protective" enzyme in many organisms, including humans, said Leinwand.

The new Science study grew out of a project Leinwand began in 2006 when she was named a Howard Hughes Medical Institute Professor and awarded a four-year, \$1 million undergraduate education grant from the Chevy Chase, Md.-based institute. As part of the award Leinwand initiated the Python Project, an undergraduate laboratory research program designed to focus on the heart biology of constricting snakes like pythons thought to have relevance to human disease.

Undergraduates contributed substantially to the underpinnings of the new python study both by their genetic studies and by caring for the lab pythons, said Leinwand. While scientists know a great deal about the genomes of standard lab animal models like fruit flies, worms and mice, relatively little was known about pythons. "We have had to do a lot of difficult groundwork using molecular genetics tools in order to undertake this research," said Leinwand. CU-Boulder already had a laboratory snake facility in place, which contributed to the success of the project, she said.

"The fact that the python study involved faculty, postdoctoral researchers, a graduate student, and an undergraduate, Christopher Wall, shows the project was a team effort," said Leinwand. "Chris is a good example of how the University of Colorado provides an incredible educational research environment for undergraduates." Wall is now a graduate student at the University of California, San Diego.

Hiberna Corp., a Boulder-based company developing drugs based on natural models of extreme metabolic regulation, signed an exclusive agreement with

“We are trying to understand how to make those signals tell individual heart cells whether they are going down a road that has pathological consequences, like disease, or beneficial consequences, like exercise.”

Leslie Leinwand (Photo by Thomas Cooper)

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CU's Technology Transfer Office in 2008, licensing technology developed by Leinwand based on the natural ability of pythons to dramatically increase their heart size and metabolism.

Directed by Nobel laureate and CU Distinguished Professor Tom Cech, the Biofrontiers Institute was formed to advance human health and welfare by exploring critical areas of biology and translating new knowledge into practical applications. The institute is educating a new generation of interdisciplinary scientists to work together on solutions to complex biomedical challenges and to expand Colorado's leadership in biotechnology. For more information on the Biofrontiers Institute, visit cimb.colorado.edu/.

Leslie Leinwand, Ph.D. is the Chief Scientific Officer at the Biofrontiers Institute (formerly Colorado Initiative in Molecular Biotechnology). She is also a Professor in the Department of Molecular, Cellular, and Developmental Biology at the University of Colorado, Boulder, CO.

Canine models of human diseases

[Reprinted with permission from the One Health Initiative website]

Thomas Monath, MD, FACP, FASTMH

A recent paper by Grall et al. published in *Nature Genetics* (2012; 44: 140-9, <http://www.nature.com/ng/journal/v44/n2/full/ng.1056.html>) and highlighted in *Science* (2012; 335:271), reminds us of the value of spontaneous diseases of animals, particularly dogs, to our understanding of human disease genetics and

pathophysiology and to the development of therapeutic interventions. Physicians concerned principally with clinical medicine, who may have more difficulty grasping One Health principles calling for closer ties with the veterinary medical community, may be especially interested in the illustration provided by this publication.

Grall et al. describe a spontaneous disease in golden retriever dogs that clinically resembles a form of congenital ichthyoses in humans. Ichthyoses include both nonsyndromic ichthyosis vulgaris and various syndromic forms associated with a noncutaneous abnormalities (e.g., Netherton syndrome, Chanarin-Dorfman syndrome, Sjogren-Larsson syndrome, and Refsum's disease). The genetic basis of ichthyoses and other rare diseases in humans is difficult to study because of the inability to collect enough families affected by a single clinical entity. In contrast, dogs are subject to intensive in-breeding used to select for desirable traits, and in consequence have developed a number of breed-specific congenital disorders. Dog breeds thus represent a unique model

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opment of therapeutic interventions.

Thomas Cech

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for identifying genetic linkages responsible for disease expression. Multiple breed-specific forms of ichthyoses have been described, and the genetic basis of a few of these have been identified: e.g. Norfolk terriers [mutation in the KRT10 (Keratin 10) gene], and Jack Russell terriers [insertion in the TGM1 gene, a gene associated with human ichthyosis also].

In the recent paper by Grall et al. a homozygous mutation in PNPLA1 was identified in golden retrievers with hereditary nonepidermolytic retention ichthyosis, a disease that has recently spread throughout the breed due to repeated in-breeding of champion dogs. The authors then studied 46 consanguineous human families with congenital ichthyoses in which previous genetic studies had failed to find a causative mutation. In two families with multiple affected siblings, homozygous mutations in PNPLA1 were found. The study showed that mutations in PNPLA1, the result of autosomal recessive segregation during in-breeding,

were responsible for a similar clinical disorder in dogs and humans.

This is not a unique example, and indeed there are numerous reports of spontaneous hereditary diseases of dogs serving as important models for human hereditary diseases, often with homologous single-gene defects. A few examples may be cited, including: Progressive retinal atrophy (PRA) in dogs is the canine equivalent of retinitis pigmentosa in humans; other retinopathies, such as Leber congenital amaurosis; X-linked myotubular myopathy in

Labrador retrievers; inherited glycogen storage disease in Maltese terriers analogous to human von Gierke disease (mutation in glucose-6-phosphatase); and trapped neutrophil syndrome in border collies, a model for Cohen's syndrome in humans.

The practical value of these genetic homologies and canine models for human medicine is immense, because the gene defects, once identified and understood, can be used for diagnosis and genetic counseling, and for the design of specific interventions, including gene therapy. The genetic bottlenecks introduced in the practice of selective breeding of dogs has revealed much about the genetic basis of human disease, and represents a field of study of invaluable consequence to human medicine. The relevance to One Health is clear.

Dr. Monath is an Adjunct Professor at Harvard School of Public Health and a co-founding member of the One Health Initiative team/website.

Because of intensive inbreeding for desirable traits, dog breeds represent a unique model for identifying genetic linkages responsible for disease expression.

A few examples of human hereditary diseases where dogs have served as important models include: progressive retinal atrophy, other retinopathies, X-linked myotubular myopathy, von Gierke disease, and Cohen's syndrome.

Fundus of patient with retinitis pigmentosa, mid stage . Hamel
Orphanet, Journal of Rare Diseases 2006. 1: 40, Figure 2.
doi:10.1186/1750-1172-1-40

Thomas Monath

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Man's best friend not immune to stigmas of war; overcomes
PTSD

[Reprinted with permission from <http://www.af.mil/news/story.asp?id=123215014>]

Monica Mendoza

PETERSON AIR FORCE BASE, Colo. (AFNS) -- When four-year-old Gina, a 21st Security Forces Squadron military working dog (MWD), returned from her five-month tour in Southwest Asia (SWA), she wasn't the same.

She was anti-social. Every sound, even the radio, bothered her. She was jumpy. And, she showed no interest in her work, which was to detect drugs and bombs.

Before she deployed, Gina had been a MWD for two years. She had trained at the Department of Defense Military Working Dog School at Lackland Air Force Base, Texas, and was assigned to Peterson AFB, Colo. Other than the gun-fire training with her handler, Gina had never been exposed to the loud booms of improvised explosive devices.

While deployed, Gina was riding with her handler when an IED went off in the vehicle behind hers. It spooked her. The constant patrols, flash bangs, the sounds of kicking in doors, and the IED booms got to her.

"When Gina came back from SWA she was so messed up, she didn't want to see anybody," said Master Sgt. Eric Haynes, the 21st SFS NCO in charge of the MWD section. "She wouldn't walk through front doors, she didn't want to go inside buildings. She was terrified of everything."

Post traumatic stress disorder (PTSD) is defined by severe anxiety that develops after exposure to a psychological trauma, and the event could have involved a threat of death. A classic sign of PTSD is avoidance of stimuli associated with the trauma.

Gina was suffering from PTSD.

MWDs are valuable partners for warrior Airmen, with thousands of them assigned to military installations and government agencies around the world. This month the Department of Homeland Security announced it would recruit about 600 dogs a

When Gina returned from her deployment in Southwest Asia, "she wouldn't walk through front doors, she didn't want to go inside buildings. She was terrified of everything."

A classic sign of PTSD is avoidance of stimuli associated with the trauma.

The Department of Homeland Security announced it would recruit about 600 dogs a year over the next five years.

MWD recovers from PTSD

Gina runs through the obstacle course at the dog kennel at Peterson Air Force Base, Colorado. (U.S. Air Force photo/Monica Mendoza)

MWD recovers from PTSD

Master Sgt. Eric Haynes praises Gina. Sergeant Hayes spent the past six months working daily with Gina. (U.S. Air Force photo/Monica Mendoza)

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year over the next five years to join the elite squadron of working dogs that sniff out bombs and drugs and help hunt for terrorists.

Peterson AFB is home to the second largest group of MWDs in the continental United States, with 15 slots. MWDs typically work 10 years, Sergeant Haynes said. He wasn't about to give up on Gina, a highly trained German shepherd and valuable member of the squadron.

"I won't say that I thought she couldn't be rehabilitated," he said. "But, I knew it wouldn't be easy."

And so began a long, arduous rehabilitation program that included daily walks through the base exchange and commissary. At first, when a person approached Gina, she tucked her tail in and covered to the ground. Sergeant Haynes sent a person ahead of him to pass out treats to store clients, who would then give Gina a treat when they approached her.

"She started having confidence,"

Sergeant Haynes said. "That is where we started."

Every day, the pair would walk around the base and into buildings so that Gina could get re-acquainted with the sounds of cars and people. Each week they got a little closer to training areas, where security forces Airmen shot blanks to practice. At the sound of the shots, Gina tried to run.

"The improvement came over time," Sergeant Haynes said. "She was quite broken. You don't want to see anyone suffering like that - people or dogs." As their rapport built up, Sergeant Haynes moved into a corrective mode with Gina. He would give her commands before someone walked through the door - before she had a chance to get scared. Leading behavioral and cognitive therapists say treatment of PTSD involves changing patterns of thinking. That's

what Sergeant Haynes was doing.

"I'm correcting the behavior at the very beginning of the problem rather than waiting for her to get scared," Sergeant Haynes said. "I can nip it in the bud before it begins, which makes her mind go to another place."

Gina has made real progress, Sergeant Haynes said. She's happy, social and playful. She enjoys her work and she is no longer terrified to be around people or noise. Two months ago, Gina was assigned

Military working dogs typically work 10 years.

Gina's long rehabilitation program included daily walks through the base exchange and commissary so that she could get re-acquainted with the sounds of cars and people.

Later, Sergeant Haynes would give Gina commands before she had a chance to get scared.

Gina has made real progress. She enjoys her work and is no longer terrified to be around people or noise.

MWD recovers from PTSD

MWD recovers from PTSD

Master Sgt. Eric Haynes plays ball with Gina. (U.S. Air Force photo/Monica Mendoza)

Gina plays during her off-duty hours (U.S. Air Force photo/Monica Mendoza)

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to partner with Staff Sgt. Melinda Miller, a 21st SFS dog handler. And, on July 1, Gina was re-certified to continue working as a MWD. She will work patrol, participate in base exercises, and continue her detection work.

Gina will continue her rehabilitation regarding gun fire and loud booms.

And she probably won't deploy to a frontline base in Southwest Asia for at least two years, Sergeant Haynes said.

"You don't want to rush it," Sergeant Haynes said. "If we take it too far, too fast, we'll be all the way back to square one."

Monica Mendoza is a Public Affairs staff writer for 21st Space Wing.

Survey of pet dogs indicate Lyme disease risk much greater than previous estimates suggest

[Reprinted with permission from <http://bristol.ac.uk/news/2012/8176.html>]

Transmitted by ticks, Lyme disease is a debilitating chronic infection

which affects a number of animals including humans and dogs. It is caused by the bacterium *Borrelia burgdorferi*. Clinical signs in humans include a characteristic circular red rash that spreads from the site of the tick bite, followed by a flu-like condition. In dogs, the symptoms can be much more vague and difficult to diagnose. If untreated, the disease progresses to neurological problems and arthritis; chronic forms of the disease can last for many years.

While only occasionally affecting humans, reported cases in the UK are thought to have increased more than fourfold since the beginning of the century – from 0.38 per 100,000 in 2000 to 1.79 per 100,000 in 2009. In 2010 there were 953 reported cases in England and Wales but the level of under-reporting is likely to be considerable.

To obtain a clearer picture of the prevalence of infected ticks, Faith Smith of Bristol's School of Biological Sciences and colleagues recruited vets across England, Scotland, and Wales to examine dogs selected at random as they visited veterinary practices. Since pet dogs largely share the same environment and visit the same outdoor areas as their owners, exposure to infected ticks in dogs is likely to provide an index for corresponding risks to humans.

Of 3,534 dogs inspected between March and October 2009, 14.9 percent had ticks. Of the samples that could be tested, 17 were positive for the *Borrelia*

Gina will continue her rehabilitation regarding gun fire and loud booms and probably won't deploy to a frontline base in Southwest Asia for at least two years.

Reported human cases of Lyme disease in the United Kingdom are thought to have increased more than four-fold since 2000.

Image of a tick
One of the ticks collected as part of the study.
Image by Faith Smith.

University logo in green

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bacteria. Hence, 2.3 percent of ticks were infected. Therefore, the prevalence of infected ticks on dogs is 0.5 percent, or 481 infected ticks per 100,000 dogs. This suggests that the prevalence of *Borrelia* in the UK tick population is considerably higher than previously thought.

Faith Smith said: “Lyme disease appears to be a rapidly growing problem in the UK with important health and economic impacts in terms of loss of working hours and potential decreases in tourism to tick hotspots.

“Without considerably better surveillance and routine diagnostic testing, Lyme disease is only likely to become more prevalent. In particular, future warmer winters might well extend the period over which ticks are active seasonally, while growing wild reservoir host populations, such as deer, will allow the tick population to expand.”

The study was published in the journal *Comparative Immunology, Microbiology and Infectious Diseases*. The research was funded by the Natural Environment Research Council (NERC) and Merial Animal Health Ltd.

CCMTR begins collaboration with Wake Forest University Institute for Regenerative Medicine

Dave Green

A new partnership between North Carolina State University and Wake Forest Baptist Medical Center will make regenerative medical treatments more quickly available to both human and animal patients. NC State's Center for Comparative Medicine and Translational Research (CCMTR) and the Institute for Regenerative Medicine at Wake Forest's Baptist Medical Center are pooling resources in order to find safe and effective ways to use cells to regenerate damaged organs in people and pets.

Dr. Jorge Piedrahita, professor of genomics at NC State's College of Veterinary Medicine and interim director of the CCMTR, believes that this partnership and the resulting joint research projects will not only benefit companion animals right away, but will also help bring these therapies to human patients more quickly.

“A major part of our work will be to translate laboratory research results into medical therapies for companion animals,” says Dr. Piedrahita. “The ability to study diseases that affect organ health in animals is critically useful for advances in human medicine as these animals share our environment and the

Researchers tested ticks from pet dogs at veterinary clinics to estimate their exposure to the infection. Since pet dogs and their owners share the same environments, this also provides an index for corresponding risks in humans

Faith Smith (PG)
Faith Smith.

Image by Chrystal Cherniwchan

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vast majority of our genes. Also, there are some human therapies currently in use that companion animals can benefit from right away, such as bladder tissue regeneration.”

The collaboration acknowledges the “need for and benefits of increased cooperation and communication” in research endeavors that support the technology of employing cells to regenerate organs. Basic research at the CCMTR and clinical cases at the College of Veterinary Medicine's Randall B. Terry, Jr. Companion Animal Veterinary Medical Center (Terry Center) are involved in the agreement.

The official collaboration will include the exchange of students and faculty, exchange of academic information, development of collaborative research, as well as joint publication of medical and scientific research papers.

“We are delighted to form a partnership with our colleagues at the Center for Comparative Medicine and Translational Research,” says Anthony Atala, M.D., director of the Wake Forest Institute for Regenerative Medicine. “The goal of the collaboration is to develop advanced treatments for companion animals as well as accelerate new regenerative medicine therapies for human patients.”

According to Dr. Piedrahita, the CCMTR offers the partnership research strengths in clinical genomics, comparative neurobiology, mucosal pathophysiol-

ogy, oncology, cell and molecular biology. In addition, challenging cases referred to the Terry Center present an unusual opportunity for biomedical researchers to study diseases that occur naturally in companion animals.

“Initial activity may involve research into organs such as the bladder and urethra,” says Dr. Piedrahita. “Our Terry Center clinicians are interested in regenerative developments in these areas because of the implications for health issues in cats and dogs. In return, the ability to study any number of diseases that affect organ health of Terry Center patients is critically useful for advances in human medicine as these diseases are occurring naturally in animals that share our environment and the vast majority of our genes.”

Dave Green is the Director of Communications and Media Relations at North Carolina State University College of Veterinary Medicine.

NC State’s Center for Comparative Medicine and Translational Research (CCMTR) and the Institute for Regenerative Medicine at Wake Forest’s Baptist Medical Center are pooling resources in order to find safe and effective ways to use cells to regenerate damaged organs in people and pets.

The collaboration will include the exchange of

students and faculty, exchange of academic information, development of collaborative research, as well as joint publication of research papers.

PawOneMed Final Slide.jpg

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The Partnership for Food Protection and FDA announce establishment of PETNet

[Reprinted from: <http://www.fda.gov/AnimalVeterinary/NewsEvents/CVMUpdates/ucm266207.htm>, August 1, 2011]

The Partnership for Food Protection and the Food and Drug Administration (FDA) announced the launch of the Pet Event Tracking Network (PETNet). PETNet is a secure, web based information exchange system that will allow FDA and Federal and State agencies to share initial information about pet-food related incidents, such as illness associated with the consumption of pet food or pet food product defects. PETNet's voluntary information exchange, surveillance, and alert system is designed to provide a real-time mechanism for sharing information about emerging pet food related illnesses and product defects between FDA, other Federal agencies, and the States.

The system will be accessible to PETNet members, who are Federal, State, and Territorial government officials responsible for the regulation of pet food products and the investigation of disease outbreaks in companion animals. Members will enter "events" into the system when they have identified a trend or a suspicious incident associated with pet food products, as well as pet food product defects within their own jurisdiction that should be communicated to their regulatory counterparts. Once entered on the standardized form, the information will be immediately available to all other PETNet members. This will enable PETNet members to track the emergence of such data and to evaluate the need for action within individual jurisdictions.

PETNet grew out of discussions held with State and federal government

public health officials at an August 2008, FDA sponsored meeting, “Gateway to Food Protection” (also known as the 2008 “50 State” meeting). Following the meeting, the Partnership for Food Protection was established by the FDA. The purpose of the Partnership is to bring federal, state, local, territorial, and tribal representatives with expertise in food, feed, epidemiology, laboratory, animal health, environment, and public health together to develop an Integrated Food Safety System.

The concept for PETNet was developed in response to the 2007 melamine pet food recall. One difficulty faced by FDA and FDA’s State regulatory partners during the melamine incident was the timely sharing of information between FDA and the States and among the States themselves. PETNet was developed with input from the States and other Federal agency partners to enable the sharing of information between Federal and State officials about instances of foodborne illness in companion animals, as well as product defects that may lead to such outbreaks.

PETNet is currently made up of over 200 representatives from 4 Federal agencies, all 50 states, Puerto Rico, and the District of Columbia.

PETNet is a secure, web based information exchange system that will allow FDA and Federal and State agencies to share initial information about pet food related incidents.

Food and Drug Administration logo.svg
PFP logo
PETNet logo

FDA starts nationwide Salmonella testing on Pet Food

[Adapted from: <http://www.fda.gov/AnimalVeterinary/Products/AnimalFoodFeeds/Contaminants/ucm277264.htm> by Mary Echols, DVM]

Last October, the U.S. Food & Drug Administration (FDA) announced that it was beginning a year-long, nationwide program testing pet food for Salmonella contamination. The FDA's Center for Veterinary Medicine (CVM) said it was concerned about animal feeds serving as vehicles for transmitting pathogenic and antibiotic-resistant bacteria to humans and other animals. The agency was particularly concerned about Salmonella being transmitted to people through pet foods, pet treats, and supplements for pets that are intended to be fed to animals in homes, where they are likely to be directly handled or ingested by humans.

The association between human outbreaks of salmonellosis and contact with Salmonella-contaminated pet foods and pet treats is well established. For example, the Centers for Disease Control and Prevention (CDC) reported that, between January 2006 and December 2007, seventy human cases of salmonellosis were linked to Salmonella Schwarzengrund in dry dog foods that were manufactured by a company in the United States.

Vulnerable populations such as children, the elderly, and individuals with compromised immune systems, are particularly susceptible to Salmonella infection from such animal feeds. Young children are especially at risk for illness because their immune systems are still developing and because they are more likely than others to put their unwashed fingers or other items into their mouths.

For these reasons, CVM considers it prudent to keep Salmonella-contaminated pet foods, pet treats, and supplements for pets out of interstate commerce. FDA investigators in October started taking samples of dry pet food, pet treats, and diet supplements from distributors, wholesalers, and retailers including PetSmart, PetCo, Walmart, Costco, Sam's Club, Target, and major grocery store chains. The testing covers dog and cat food but also feed for rabbits, reptiles, birds,

aquarium fish and rodents such as hamsters, mice, and guinea pigs. The program will also provide additional surveillance information on microbes other than Salmonella in pet foods, pet treats, and supplements for pets.

The CDC advises that consumers take the following precautions to avoid contracting Salmonella from tainted pet food or sick pets:

The FDA began a year-long, nationwide program testing pet food for Salmonella contamination.

The agency was particularly concerned about Salmonella being transmitted to people through pet foods, treats, and supplements.

FDA investigators started taking samples of dry pet food, treats, and supplements from distributors, wholesalers, and retailers.

File:Pet Food Aisle.jpg

PHIL Image 6619

XLD agar culture plate cultivated with colonial growth of Gram-negative, rod-shaped, and facultatively anaerobic *Salmonella* sp. bacteria. Courtesy CDC.

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- . After contact with animals, their food, or their environments, wash your hands well with soap and running water.
- . Clean up after your pet. If you have a cat, scoop the litter box daily and dispose of the stool in a tightly sealed plastic bag. If you have a dog, clean up the stool while on walks or from the yard daily and dispose of the stool in a tightly sealed plastic bag.
- . Children younger than 5 years of age should not be allowed to touch or eat pet food, treats, or supplements and should be kept away from pet feeding areas.

World Bank funds health project into second phase

[Reprinted from: http://www.massey.ac.nz/massey/about-massey/news/article.cfm?marticle_uuid=09B36896-0BE9-56D4-8151-7BE22D89B2E2]

The World Bank has granted Massey University five million dollars in funding to extend its education program strengthening Asian public health and veterinary capacity to combat zoonotic diseases.

In the first phase of the program that has just completed, 67 health professionals from India, Pakistan, Sri Lanka, Bangladesh, Afghanistan, and Nepal were trained in One Health epidemiology concepts as part of two Massey qualifications specifically developed for the program – a Master of Veterinary Medicine (Biosecurity) and a Master of Public Health (Biosecurity).

Now, Massey staff working with colleagues from other leading

international universities will enable that learning to be put into practice, through the development of One Health Hubs and collaborative disease investigation projects.

These activities will assist the former students and their health professional colleagues in the South Asia region to combat real-world problems relating to zoonotic diseases such as avian influenza, rabies, brucellosis, and anthrax.

Project Director Dr. Eric

Neumann says the second phase builds on the Masters degree training and provides the graduates with a chance to “operationalize the concepts they’ve learned through their formal Massey training and to extend their expertise to others in the region.”

Washing hands after contact with animals, their food, or their environments can help prevent Salmonella infection.

Massey University staff and colleagues from other leading interna-

tional universities will work to develop One Health Hubs and collaborative disease investigation projects.

[Go to the Massey University home page](#)

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The phase-two activities will involve creation of an organizational structure embedded in the South Asia region, development of a collaborative online work environment, and implementation of disease investigation projects that are focused on the critical health needs identified in each country, he says.

One Health Hub project manager Dr. Peter Jolly says the One Health Hubs are a key vehicle for applying the training completed to date. “We now have trained specialists in each country that will lead projects focused on important zoonotic diseases in their countries,” he says. “Through building intellectual capacity in the region, control of endemic and emerging zoonotic diseases such as avian influenza can be undertaken using an integrated approach that involves both veterinary and public health specialists.”

An online meeting point – HubNet – is being devised to provide both the forum and the resources needed to carry out these projects.

“HubNet gives participants an operational framework,” Dr Jolly says. “The online forum will provide them the space to interact with one another and also give them access to an e-library, disease database, communications and reporting tools, and a learning management system.”

Once hub members begin work on a project, they can efficiently identify sampling or experimental work that needs to be carried out and be mentored through to its completion. “We want these projects to influence policy and have a real impact,” Dr. Jolly says.

The phase-two funding covers One Health Hub activities through to the end of 2013. By this time, Dr. Neumann anticipates the hub participants will have the experience necessary to maintain the collaborative environment provided by HubNet with much less reliance on Massey University. “The idea is to create enough value in the HubNet environment that the early participants are motivated to adopt it as their own.”

The World Bank manages funding for the Masterate training and development of One Health Hubs on behalf of the Avian and Human Influenza Facility, a multi-donor trust fund financed mostly by the European Union that supports influenza-related programmes in various countries.

“Through building intellectual capacity in the region, control of endemic and emerging zoonotic diseases such as avian influenza can be undertaken using an integrated approach that involves both veterinary and public health specialists.”

-Dr. Peter Jolly, One Health Hub project manager

Once hub members begin work on a project, they can efficiently identify sampling or experimental work that needs to be carried out and be mentored through to its completion.

neumann-eric-jolly-peter.jpg
Dr. Eric Neumann and Dr. Peter Jolly

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One Health in Action: USAID’s Emerging Pandemic Threats program and the PREDICT collaboration

Meredith Barrett

USAID's Emerging Pandemic Threats program (EPT; http://www.usaid.gov/press/releases/2009/pr091021_1.html) emphasizes early identification of, and response to, dangerous pathogens in animals before they can become significant threats to human health. Using a risk-based approach, the EPT program builds on USAID's successes in disease surveillance, training, and outbreak response to focus on geographic areas where these threats are most likely to emerge. These efforts are critical to the sustainability of long-term pandemic prevention and preparedness. They will help develop better predictive models for identification of future viral and other biological threats. The EPT program draws on expertise from across the animal and human health sectors to build regional, national, and local capacities for early disease detection, laboratory-based disease diagnosis, rapid disease response and containment, and risk reduction. The program accomplishes these tasks through four key sub-programs: PREDICT, RESPOND, IDENTIFY, and DELIVER. You can explore their website above for further information. Here we will summarize the PREDICT program.

PREDICT (www.vetmed.ucdavis.edu/ohi/predict) is building a global early warning system to detect and reduce the impacts of emerging diseases that move between wildlife and people. PREDICT has developed a SMART surveillance method (Strategic, Measurable, Adaptive, Responsive, and Targeted) that accounts for the fact that zoonotic pathogens, such as influenza and SARS, are responsible for the majority of emerging infectious diseases in people, and that more than three quarters of these emerging zoonoses are of wildlife origin. The SMART surveillance approach is designed to detect novel diseases with pandemic potential early, giving health professionals the best opportunity to prevent emergence and spread. It also targets sentinel animal species at active human interfaces in hotspot regions to improve surveillance efficiency. The PREDICT team builds on a broad coalition of partners to develop the global capacity to monitor diseases at the animal-human interface and develop a risk-based approach to concentrate these efforts in surveillance, prevention, and response at the most critical points for disease emergence

USAID's Emerging Pandemic Threats program draws on expertise from across the animal and human health sectors to build regional, national, and local capacities for early disease detection, laboratory-based disease diagnosis, rapid disease response and containment, and risk reduction.

PREDICT is building a global early warning system to detect and reduce the impacts of emerging diseases that move between wildlife and people.

Figure 1. The PREDICT program is building a global early warning system for emerging zoonotic diseases in hotspots around the world. Used with permission from the PREDICT One Health Consortium.

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from wildlife (<http://www.vetmed.ucdavis.edu/ohi/predict/publications/index.cfm>).

The PREDICT project is working in twenty countries (Figure 1) to:

- . Assess local surveillance capacity
- . Implement targeted and adaptive wildlife disease surveillance systems
- . Develop and deliver new technologies to improve detection and response efforts close to the source
- . Use cutting-edge information management and communication tools to bring

the world closer to realizing an integrated, global approach to emerging zoonotic diseases.

This collaboration has already led to several publications, including:

JH Epstein et al. 2010. Identification of GBV-D, a Novel GB-like Flavivirus from Old World Frugivorous Bats (*Pteropus giganteus*) in Bangladesh. *PLoS Pathogens* 6:7 e1000972.

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The One Health Newsletter is interested in publishing articles from a variety of view points and perspectives, and thus any opinions or statements made in the Newsletter's articles belong solely to the respective author(s), not the Editor, Editorial Board, or Newsletter Contributors.

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Coming Events

15th International Congress on Infectious Diseases (ICID)

Bangkok, Thailand

June 13-16, 2012

<http://www.isid.org/icid/index.shtml>

13th ISVEE Conference, 2012

The International Society for Veterinary Epidemiology and Economics

“Building Bridges - Crossing Borders”

Maastricht, Netherlands

August 20-24, 2012

<http://isvee13.org/>

4th International EcoSummit

“Ecological Sustainability: Restoring the Planet’s Ecosystem Services”

Columbus, OH, USA

September 30-October 5, 2012

<http://www.ecosummit2012.org/>

2nd International One Health Congress

“A world united against infectious diseases: cross-sectoral solutions”

Bangkok, Thailand

January 29-February 2, 2013

<http://www.pmaconference.mahidol.ac.th/>

logo

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Recent One Health Publications

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Wildlife, trade, susceptibility amplify food risks. Greg Cima. JAVMA News. February 2012. <http://www.avma.org/onlnews/javma/feb12/120215a.asp>

Plastic-wrapped planet. Laura H. Kahn. Bulletin of the Atomic Scientists. April 2012. <http://www.thebulletin.org/web-edition/columnists/laura-h-kahn/plastic-wrapped-planet>

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Recent One Health Publications (continued)

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