

# ERH Emitter

Department of Environmental & Radiological Health Sciences

College of Veterinary Medicine and Biomedical Sciences

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## VTH Takes Jump into Virtual Age

Since X-ray film was introduced into a medical setting, the problem of storing, filing, finding, and sharing images has grown exponentially, along with imaging technology. At the James L. Voss Veterinary Teaching Hospital, a revolution is under way to move from analog to digital images, helping to eliminate many of the tribulations that plague current diagnostic imaging management systems and at the same time improving client service, enhancing operating efficiencies, and streamlining research work flow.

“The Veterinary Teaching Hospital, like most medical institutions, is awash in a sea of information that if harnessed can be used to save time, improve patient outcomes, and make life easier for faculty, staff, and clients,” said Kevin Kirsch, RIS/PACS Coordinator with the Department of Environmental and Radiological Health Sciences. “The tricky part is capturing that information in a way that is accessible, makes sense, and is user friendly.”

Kirsch, who is responsible for the hospital’s analog to digital conversion, said the multiphase project is already under way, starting with Phase 1 where the Hospital Information System (HIS) will connect to the hospital’s Radiology Information System (RIS).

By integrating the two systems, orders will flow one way and reports and billing will flow back. Attending veterinarians will be able to view this information through VetPoint, the hospital’s Electronic Health Record (EHR) program, which links back into the RIS. This saves clinicians time and is user-friendly, allowing easy access to patient reports. Wireless carts with laptops already are in use at the hospital and veterinarians will be able to access electronic records through these systems.

Phase II of the plan is expected to come on line in the second quarter of 2009. This phase includes the launch of a new Picture Archive and Communication System (PACS) that will integrate with HIS,



Kevin Kirsch at new viewing station.

RIS, and VetPoint, allowing patient images to be directly accessed via a Web-based URL (universal resource lookup) and viewed in a digital format. Images from PET/CT (computerized tomography), ultrasound, magnetic resonance imaging, nuclear medicine, and digital radiography will be stored and distributed through the new PACS system. Three-headed work stations for image reviews are being installed at the hospital, replacing the ever-present light boxes currently used to read X-rays.

“At Poudre Valley Health System, we conducted a study after the conversion to digital and found that physicians in the five subspecialties that order 80 percent of the diagnostic imaging exams saved an hour a day because of the ease of use and accessibility of PACS,” said Kirsch, who, prior to joining the College of Veterinary Medicine and Biomedical Sciences, managed the PVH analog-to-digital conversion. “We also found that the incidence of unread exams and lost films, where the image is not attached to a report, dropped to zero. This type of quality improvement really enhances patient care

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### *In This Edition:*

• *New Department Head* •

• *NIH Funds DNA Research* •

• *Student Converts Car to “Greasel”* •

*and More . . .*

# Welcome

Dear Friends,

Autumn is a time of change as the leaves turn color and begin to fall. The mornings and nights are cool here in Colorado, but the sun continues to blaze brilliantly during the day. Our students are well into their studies, as they transition from the somewhat unencumbered days of summer to rigorous and demanding academic schedules. This is also a time of change for the Department of Environmental and Radiological Health Sciences, as Dr. Jac Nickoloff takes over as Department Head as of Oct. 1, and I return to a faculty position.



Dr. John Zimbrick

I am transitioning from my administrative duties to more research and teaching, and also am looking forward to spending more time in the laboratory as well as having additional time with my family.

It has been a great pleasure to reach out to faculty, staff, students, friends, and alumni through the pages of *Emitter* magazine and keep you up to date on what is happening in the Department of Environmental and Radiological Health Sciences. Many of you have been in touch with me, expressing your support for the Department and the work that we do. Thank you so much for your kind words, and for making me feel so welcome in the Colorado State community. I wish everyone the best of luck in all their endeavors, and keep in touch.

Best Regards,

John D. Zimbrick, Ph.D.

Professor, Department of Environmental and Radiological Health Sciences

*“It was an honor and a privilege to serve as Department Head, and I value the friendships I have made.”*

I'll also be helping Dr. Nickoloff as he takes over the Department, supporting him in his endeavors and helping to ensure he gets off to a good start. I want to thank everyone for their support during the past five years. It was a great honor and privilege to serve as Department Head and I value the friendships I have made. I am always amazed at the caliber of the people Colorado State University is able to attract, and nowhere is that more evident than in the Department of Environmental and Radiological Health Sciences.

In this edition of *ERHS Emitter*, you'll read about some of those people, as well as learn about changes coming to the James L. Voss Veterinary Teaching Hospital that will improve patient care and make life easier for hospital faculty and staff. Kevin Kirsch, our new RIS/PACS coordinator, is taking the hospital from analog to the digital age. Meet our new Department Head and find out his vision for the Department as well as a little bit about where he comes from. You'll also meet Dr. Susan LaRue in our faculty profile; Dr. John Till, one of our amazing alumni; and an undergraduate student who is running his car on used vegetable oil salvaged from area restaurants. Find out about a new research program funded by the National Institutes of Health that is looking to unlock the secrets of previously undetectable radiation-induced chromosomal changes.

## Editor's Note

*Dr. John Zimbrick received the “Excellence in Mentoring” award during the Radiation Research Society’s annual meeting held in Boston, Sept. 21-25. A number of Dr. Zimbrick’s current and former students nominated him for the award, citing his passion for mentoring the next generation of radiation researchers.*

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## ERHS Welcomes New Department Head Jac Nickoloff

The Department of Environmental and Radiological Health Sciences welcomes Dr. Jac Nickoloff as new Department Head.

Dr. Nickoloff, formerly a Professor in the Department of Molecular Genetics and Microbiology at the University of New Mexico, began work at Colorado State University on October 1.

“Dr. Nickoloff brings to the department experience as a productive researcher, and administrative experience from his years as a department chair,” said Dr. Lance Perryman, Dean of the College of Veterinary Medicine and Biomedical Sciences. “He will be able to continue to move ERHS forward with strong leadership while fostering collaborative research and teaching efforts across the Department, College, and University.”

Originally from California, Dr. Nickoloff came to the sciences at a young age. When he was in the ninth grade, his older brother was taking a course in biochemistry and was sharing what he was learning with his younger brother.

“My brother was a big influence on me,” said Dr. Nickoloff. “He had traveled abroad a lot and on one of his trips to South America had contracted dysentery which, at the time, didn’t have an effective treatment. Anytime he had stress, he would suffer a bout of illness from dysentery. Biochemistry exams always caused stress, so he had to repeat the class three times – I learned a lot along the way and knew that I wanted to do something in biology and biochemistry.”

Dr. Nickoloff received his degree in biochemistry from the University of California at Santa Barbara, and then moved to Boulder, Colo., where he received his doctoral degree in biochemistry from the University of Colorado in 1984. At around the same time, genetic engineering was emerging as a new science. Dr. Nickoloff jumped in, starting with plant genetics, and “never looked back.” Following two postdoctoral fellowships, one at Scripps Clinic and Research Foundation and the other at the Los Alamos National Laboratory, he joined the faculty at the Harvard School of Public Health in 1990. In 1996, he began his career at the University of New Mexico, serving as chair of the Department of Molecular Genetics and Microbiology from 1998 to 2006.

*“What is wonderful about ERHS is the diversity of the faculty and the ability to attack problems on so many different fronts with so many different types of expertise. We all share common goals, and it will be great to be a part of that team effort.”*



Dr. Jac Nickoloff

Growing up in Sierra Madre, a small town near Pasadena, Dr. Nickoloff had a love of the San Gabriel Mountains where he would find refuge from the chaos of the city. When he moved to Boulder, the mountains once again offered sanctuary. Now, in Fort Collins, Dr. Nickoloff feels like he is coming home. The geography not only feels familiar, but he has worked with many ERHS faculty members over the years, and looks forward to building on those relationships as well as establishing new ones.

“I am incredibly optimistic about the Department, College, and University,” said Dr. Nickoloff. “I am a huge proponent of research in general, and my professional life has been completely devoted to cancer research. What is wonderful about ERHS is the diversity of the faculty, and the ability to attack problems on so many different fronts with so many different types of expertise. We all share common goals and it will be great to be a part of that team effort. It will be an interesting challenge to work with such a diverse group and make sure everyone is getting the support they need in order to be successful in their endeavors.”

As Dr. Nickoloff settles into his new position, his first priority will be meeting each member of the faculty, visiting labs, and learning more about their research, teaching, and service activities. Additionally, the Department is currently searching for new faculty members and will initiate additional new searches in the near future. By January, he also will set up his research laboratory, where he will continue his NIH-funded studies. These include studies into the molecular mechanisms of DNA repair processes and how these help maintain genome stability and suppress cancer in the face of DNA damage caused by radiation and chemical toxins.

“At the University of New Mexico, I chaired the Department of Genetics and Molecular Biology while maintaining a large research laboratory,” said Dr. Nickoloff. “It’s always a balancing act, but gives you a perspective from all sides. Since the Department here is larger than in New Mexico, I will need to scale back my research activities appropriately to ensure that my primary focus is on working for the faculty, staff, and students of ERHS.

“It’s a very exciting time to be in the cancer biology field. Faculty in my department at the University of New Mexico were instrumental in the development of the human cervical cancer vaccine, which holds great promise for reducing cervical cancer incidence. I recently learned about a new melanoma vaccine that is effective in curing this deadly disease in dogs. I am committed to enhancing animal cancer research at CSU as this will benefit pets and their owners in the near term, and provide important insights that will translate to more effective human cancer prevention, diagnostic, and treatment strategies.”

## From Human to Animal Hospital, Network Specialist Enjoys New Challenges

When Kevin Kirsch moved to Colorado from South Florida 12 years ago, it was in part for easier access to skiing, and in part to reduce exposure to hurricanes. He joined the radiology staff at Poudre Valley Hospital (PVH) as a radiology technician and over time moved into an information technology role. He didn't imagine at the time that he would one day leave the human environs of PVH and relocate to a hospital where most patients walk to exam rooms on four legs, the sound of their clicking toenails echoing through linoleum-paved corridors.

"It has been a challenge to learn the veterinary world," said Kirsch, who joined the Department of Environmental and Radiological Health Sciences in May 2008 to direct the conversion of the hospital's information systems from analog to digital, and manage the integration of existing systems. "What I have learned already is that people are here for a reason. They care and are compassionate about animals. It's all about the animals here, in an amazing way. I'm impressed by the protocols of care, many of which are similar to human medicine."

Kirsch worked as a radiology technician for many years, spending more than 28 years in human health care, then returned to school in 2000 to earn his networking degree. His clinical skills and cross-



*Dr. Kevin Kirsch*

training in networking and PC troubleshooting were put to work when Poudre Valley Hospital decided to convert their radiology and cardiology imaging systems to a Picture Archive and Communications System (PACS). The College of Veterinary Medicine and Biomedical Sciences was looking to convert the James L. Voss Veterinary Teaching Hospital to PACS and toured PVH shortly after its conversion was complete to learn more about the process and the system.

"CSU came through on a site visit to see how we implemented PACS and I gave them a job description for the person they would need to implement their conversion," said Kirsch. "When they offered me the position, I was very excited. Our conversion was complete at PVH and I was looking for

a new challenge. This just happened to work out perfectly and I am so pleased to be here."

Kirsch is now learning more about the imaging challenges presented by nonhuman patients, and how veterinary hospitals operate differently from human hospitals. (Third-party payers are very rare.) More than anything, he enjoys helping the hospital improve patient care and the lives of veterinarians by implementing a system that will make it easier to care for those four-legged patients clicking their way through the James L. Voss Veterinary Teaching Hospital.

### Veterinary Teaching Hospital Takes Jump into Virtual Age

*continued from page 1*

and reduces frustration for physicians who are trying to keep track of multiple patients and multiple reports."

The new system also will make it easier for outside veterinarians to consult with experts at Colorado State. Currently, most images are "sneakernetted," noted Kirsch. Sneakernet is a tongue-in-cheek term used to describe the transfer of electronic information by carrying removable media devices such as compact discs and flash drives from one computer to another, especially when files contain large amounts of data. That physical transfer of electronic data can take days, adding unnecessary time to consulting cases and slowing down patient care. Kirsch has Beta-tested the technology with Dr. Richard Parks, who was able to speed up his radiology consulting turnaround time by accessing the RIS, reading images, dictating reports, and submitting transcripts. Speed and ease-of-use will dramatically improve the workflow for CVMBS radiologists who view on average 15,000 case images each year. The digital conversion also allows for a greener operation of the hospital, reducing dependency on film and processing chemicals.

Of course, anytime new technology is introduced, educating the radiology staff and attending veterinarians is critical to success and making the most of the technology's applications. In addition

to spearheading the conversion, Kirsch is working on training programs to be sure everyone is able to use the new integrated system to the greatest advantage. Kirsch noted that once Phase II is completed, veterinarians will have one-stop access to a complete picture of each patient, including reports and notes, laboratory work, history, and images.

With its fully integrated digital imaging systems and records, the Veterinary Teaching Hospital will be able to coordinate activities with other hospitals and research institutions. Kirsch hopes to increase connectivity and bridge the gap between the Poudre Valley Health System and the VTH, sharing images and developing relationships between human and veterinary radiologists.

"This is a hugely complex challenge with many pieces that have to be integrated and put in place," said Kirsch. "The Computer Resource Group at CVMBS has done a fabulous job of working with a legacy system and interfacing it with a state-of-the-art RIS.

Integrating old technology to new technology is very difficult, and they've managed to do it with skill and dedication. The Veterinary Teaching Hospital is taking the lead among its peer institutions in converting from analog to digital, and our patients are the beneficiaries."

# NIH Funds Project to Investigate Chromosomal Alterations from Radiation Exposure

**D**r. Susan Bailey, an Associate Professor in the Department of Environmental and Radiological Health Sciences, has received a five-year, \$1.25 million grant from the National Institute of Allergy and Infectious Diseases to investigate the chromosomal alterations in basic mechanisms of radiation injury. Dr. Andrew Ray, also with ERHS, and Dr. Michael Cornforth, with the University of Texas Medical Branch at Galveston, are co-investigators on the project. The grant supports Homeland Security efforts to conduct studies into radiation exposure as might occur from a terrorist attack.

“Response to an incidence of radiation exposure, from bioterrorism or a dirty bomb, has been focused on the immediate,” said Dr. Bailey. “What happens when an attack occurs? What do we do first? How do we triage and treat victims? We are beginning to look a bit beyond that and investigate what happens to the people who survive. We want to look at what happens to their DNA, look at the mechanisms of change and begin to evaluate the cancer risk or other risks they will deal with for the rest of their lives.”

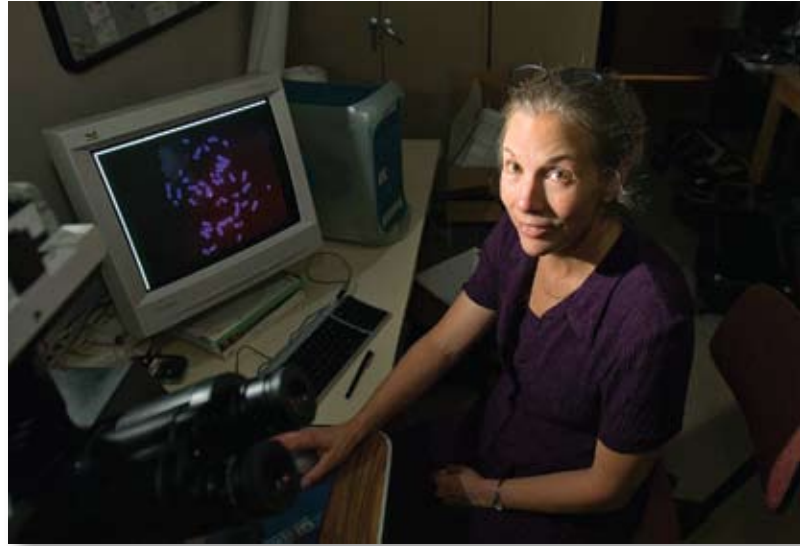
The two most important cellular effects of ionizing radiation (IR) are cell reproductive death and the production of permanent heritable changes in a proportion of living cells. Specifically, Dr. Bailey’s team is looking at radiation-induced inversions and deletions that result from chromosome intrachanges, changes that occur within an arm of a given chromosome. Current technology easily detects most large-scale chromosomal events that occur between different chromosomes, such as translocations. But there is a need to improve the detection of smaller scale events, such as the mis-rejoining of DNA double strand breaks that can lead to small deletions or inversions that are close to, or below, the level of resolution of light microscopy and therefore are difficult to detect.

“By developing methodologies to detect radiation-induced intrachromosomal changes, we hope to provide valuable clues into the processes involved in IR-induced injury to the genome and the biological consequences of that injury,” said Dr. Bailey who, along with Dr. Ray, is focusing on inversions while Dr. Cornforth’s research is targeted at deletions. “Such an understanding will serve to guide the design and timing of possible intervention strategies following accidental exposure to radiation or terrorist attack.”

More robust detection also would be useful for biodosimetry, the estimation of radiation dose from measurements of biological damage, because it would effectively add an additional category of aberrations not previously measurable.

Through bioinformatics, Dr. Bailey’s team is using information about the human genome sequence to guide design of single-stranded probes to unique DNA sequences. And, because most inversions are transmissible, they should be detectable for many years following their initial formation. Dr. Bailey is investigating the use of CO-FISH and CGH microarray strategies to greatly improve detection of IR-induced chromosomal rearrangements. CO-FISH (Chromosome Orientation – Fluorescent in situ Hybridization) is a strand-specific cytogenetic technique that can be used to detect

even small inversions, currently termed “cryptic” because they are not detectable in current assays. CGH (Comparative Genomic Hybridization) microarrays may help improve the resolution of detection of chromosome deletions, a complementary event to inversions that occur within a given chromosome; both may serve



*Dr. Susan Bailey*

as reliable biomarkers of past exposure and predictors of radiation risk. The hope is that these sensitive detection methodologies will ultimately lead to discovery of novel cancer genes, opening new directions of investigation and treatment.

“Our hypothesis is that there are really a lot of these deletions and inversions happening, we just are not able to see them with the assays we now have,” said Dr. Bailey. “So we are developing powerful new approaches to greatly improve the resolution and detection of chromosomal inversions and deletions. We envision fine-mapping of radiation-induced breakpoints associated with interstitial deletions to represent an important first step toward future experiments. Future studies will investigate changes in transcription levels of genes flanking the exchange breakpoints, including those genes with carcinogenic potential. Another direction of the project is to develop a sensitive method to detect IR-induced inversions that we call chromatid painting. A full set of chromatid paints for all the chromosomes will allow inversions to be monitored simultaneously across the genome.”

Dr. Bailey and her co-investigators are teaming up with KromaTiD Inc., a small startup company developed through the Colorado State University Cancer Supercluster and its business arm, *NeoTRES*. Founding members of the company include Drs. Bailey, Ray, and Cornforth, as well as CSU Professor Emeritus Joel Bedford and Edwin Goodwin, Chief Executive Officer. KromaTiD is a consultant on the project and also will help in the transfer of applicable technology from the research bench to the private-sector marketplace.

# FACULTY PROFILE

## New Technology Keeps ERHS Faculty Member Reaching New Heights

The Varian Trilogy Linear Accelerator has amazing capabilities. But it is only as good as the training of the people who use the system for veterinary diagnosis, treatment, and research at the James L. Voss Veterinary Teaching Hospital. Dr. Susan LaRue will attest that the learning curve for the Varian is steep and seemingly extends into the netherworld, but the benefits to patients are worth all the effort.

“When I arrived at CSU, I was working with our first linear accelerator, which was purchased in 1981, and was the only one in use in a veterinary teaching hospital,” said Dr. LaRue, a Professor in the Department of Environmental and Radiological Health Sciences. “In 1994, we acquired a newer linear accelerator and were able to expand our treatment facilities, and we still had the only one in the United States. In 2000, we acquired a three-dimensional treatment planning system.”

Last year, the Department acquired the Varian Trilogy, which offers state-of-the-art planning and treatment capabilities. The Trilogy is equipped with an on-board imager that enables clinicians to track the motion of tumors while the patient is lying on the treatment platform and deliver radiation at higher doses with unparalleled accuracy. The system has an RPM Respiratory Gating system which enables medical staff to deliver treatments more precisely by tracking and adjusting for tumor movements caused by breathing.

Treatment is further fine-tuned through the use of a multileaf collimator that can shape the beam during treatment in response to changes in tumor dimensions from one point to another. Another feature is the Acuity X-ray system with conebeam CT capability for generating 3-D images of tumors and surrounding healthy anatomy that sync up to the treatment planner. The CT capability also allows for accurate positioning of the patient to ensure that the tumor is positioned properly during treatment.



Dr. Susan LaRue

“The learning curve for the Trilogy has been a huge challenge, but our capabilities have increased so tremendously it’s worth all the effort, and this machine is just amazing,” said Dr. LaRue. “Because of our ability to precisely target the beam, our latest advance with the Trilogy is radiosurgery. We’ve been treating patients with this new technique since February and are very happy with the results, but we will keep evaluating.”

Dr. LaRue did her undergraduate work at the University of Maryland, and then attended the University of Georgia where she graduated from the veterinary program and completed an internship. She then came to Colorado State University for a residency in surgery. Her interest in radiation oncology led her to a Ph.D. in radiological health sciences. In 1992, Dr. LaRue joined the faculty



Dr. LaRue positions a patient for treatment.

in the Department of Radiology – now the Department of Environmental and Radiological Health Sciences.

A member of the American College of Veterinary Radiologists, Dr. LaRue has a specialty in radiation oncology. She is active in the Radiation Research Society and with the American Society for Therapeutic Radiology and Oncology. She also is in the unique position to teach not only veterinary students, but also residents, graduate students, and undergraduates (teaching part of an undergraduate radiation biology course).

“When I was doing my surgery residency here, I worked with Dr. Steve Withrow, who was pioneering surgical limb-sparing for osteosarcoma patients,” said Dr. LaRue, whose husband Dr. Chris Orton also is a veterinarian and a faculty member in the Department of Clinical Sciences. “I became interested in oncology in general and needed more research training so Dr. Edward Gillette offered me a Ph.D. position in the department. I was still studying cancer, so it was a perfect fit.”

In addition to her teaching and clinical work, Dr. LaRue is working with a number of faculty members on new research projects including: stereotactic radiosurgery (SRS), where patients are given the radiation in a few large, targeted fractions for limb-sparing in canine osteosarcoma; SRS for feline pituitary tumors, which cause a condition called acromegaly (excessive secretion of growth hormone); brain tumors; bladder tumors; and evaluation of optimal dosing and fractionation schedules for SRS.

When Dr. LaRue is not busy with research, teaching, clinical duties, and Varian Trilogy training, she can often be found at her children’s sports, working in the garden, or cycling. She is an avid cyclist (Dr. LaRue says it keeps her sane) who rides almost every weekend (weather permitting) and completed the Colorado Triple Bypass (a 123-mile, three-peak ride) in the Colorado Rockies this year.

## Parkinson's-Like Illness Leads to Research into Toxic Effects of Manganese

For more than 150 years, scientists have been aware of the detrimental health effects of welding and associated manganese exposure. For those who don't work in an industrial setting, manganism may not be a familiar illness, but the disease it mimics, Parkinson's disease, most likely is. The National Institutes of Health is funding research at Colorado State University to investigate the biological foundations of manganism, and how manganese exposure can lead to the development of this Parkinson's-like disease.

Like most people, Dr. David Carbone, a postdoctoral fellow in Dr. Ron Tjalkens' laboratory in the Department of Environmental and Radiological Health Sciences, wasn't too familiar with manganism. But his training in toxicology and work in Dr. Tjalkens' lab has helped him to create a research program that may shed new light on how manganese creates toxic effects on the human body, and how the metal affects the function of astrocytes and neurons in the brain.

"Parkinson's and manganism are both movement disorders that are symptomatically very similar but affect different areas of the brain," said Dr. Carbone. "The health effects of welding and associated manganese exposure have been known since the mid-1800s, but there is still so much we don't understand about how manganese is toxic to the body and creates changes in the brain and liver, leading to Parkinson's-like symptoms as well as severe liver disease."

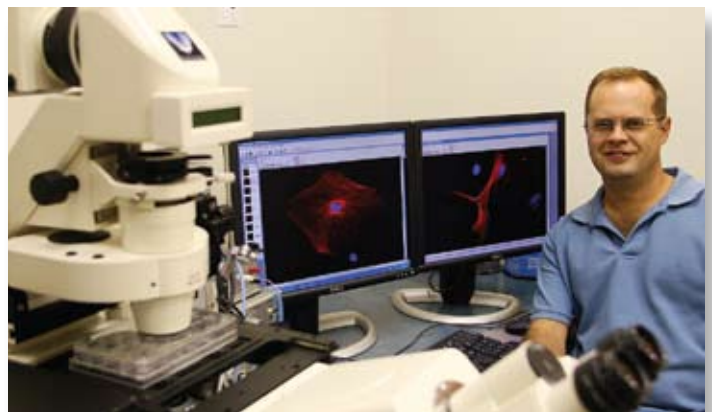
Dr. Carbone came to his research in manganism as result of his interest in toxicology. Growing up in Boulder, Colo., he attended Colorado State University for his undergraduate degree. Originally starting out in biological sciences, he learned about the microbiology program and the supportive community within the Department of Microbiology, Immunology and Pathology, and decided to make the switch (which turned out to be fortuitous because he also met his wife, Beth, who was in the microbiology program and now works at Colorado State University's Equine Orthopaedic Research Center). While at Colorado State, Dr. Carbone worked for Dr. Bill Black, a professor in the Department of Environmental and Radiological Health Sciences, helping with computer work. (Dr. Carbone has a minor in computer sciences.)

Following graduation, he decided to pursue graduate school at the University of Colorado Health Sciences Center in Denver in the Department of Pharmaceutical Sciences. While there, he worked in the laboratory of Dr. Dennis Peterson, the same lab that Dr. Carbone's faculty mentor, Dr. Tjalkens, had worked in several years previously. The team in Dr. Peterson's lab was working with a model of alcoholic liver disease looking at protein quality control mechanisms, including protein degrading and folding, and how those are disrupted.

"We were searching for the threshold where damage becomes irreversible, and if it was possible to interdict to try to halt the transition into full-blown cirrhosis," said Dr. Carbone. "The project had support from the National Institutes of Health and I had pre-doctoral funding as well, so I enjoyed the opportunity to do research in toxicology and was definitely interested in pursuing similar research endeavors as a postgraduate."

When Dr. Carbone heard of an opening in Dr. Tjalkens' laboratory, he and his wife decided to move back to Fort Collins. Dr. Tjalkens focuses on neurodegenerative movement disorders, including such conditions as Parkinson's disease, and has taken several approaches to better understand what is happening to the astrocyte cells that support neurons.

"In Parkinson's disease, we are studying the role that excess nitric oxide may play in neurological conditions, and asking the question, can we identify the disease early, then halt destructive events to stop or slow down progression of the disease?" said Dr. Carbone. "We believe that inflammation of astrocytes, which act as caretakers for neurons, plays a significant role in the development and progression of Parkinson's disease."



*Dr. David Carbone*

While astrocytes are primarily caretakers, inflammation can cause a change in phenotype and the normally supportive astrocyte becomes destructive. Nitric oxide is secreted by astrocytes and causes vasodilation, but too much of a good thing is no longer a good thing. High concentrations of nitric oxide can be cytotoxic. The question is, do the cells change phenotypes because of an excess of nitric oxide in the system or do the cells change phenotypes and then produce an excess of nitric oxide? The abnormal intercellular interaction between astrocytes and neurons can disrupt or alter functions, leading to progressively worse neurological problems.

Dr. Carbone and the Tjalkens research team are looking at a low-grade inflammatory model to answer the "which comes first" question, as well as looking at the role of environmental factors and genetic issues in not only Parkinson's disease but in manganism. The connection between the two diseases helps to multiply the benefits of anything learned in the laboratory.

Dr. Carbone is planning to continue his work in toxicology and is currently applying for a Pathway to Independence Award, an NIH award given to young researchers to help in the transition from postdoctoral fellow to research faculty. The award gives one to two years of mentored research to help secure a tenure track position, then provides additional support to enable the individual to build a research program so he or she "can hit the ground running," noted Dr. Carbone.

# ALUMNI PROFILE

## Farming, Submarines, and Risk Assessment Lead to Full Life for ERHS Grad

When you talk to Dr. John Till, you can't help but be at least a little bit inspired. He has served as a Rear Admiral in the U.S. Naval Reserve, owned and operated a 1,000-acre farm in South Carolina, and founded the Risk Assessment Corporation. If you're not impressed yet, keep in mind that he pursued each of these three endeavors simultaneously (while also raising a family and helping to care for elderly relatives). To understand how all these seemingly disparate lines of work came together, is to understand the quality and humility of Dr. Till's character and how duty to family and country shaped his life.

Growing up near Atlanta, Ga., his summers were spent on the family farm which, at the time, was one of the largest dairies in the state of South Carolina. His grandmother and three uncles worked the farm and Dr. Till was greatly influenced by his uncles' stories of their time in the military and service during World War II. He was inspired to attend a military academy, gaining acceptance into the Naval Academy in 1963 where he studied nuclear science with ambitions to enter the highly competitive nuclear submarine program. He was accepted into the program after an intimidating interview with the now well-known Adm. Hyman Rickover, father of the nuclear submarine. Dr. Till received training at three additional Navy schools in California, Idaho, and Connecticut, studying nuclear power, nuclear reactors, and submarine prototype training, and submarine school. He was then assigned to the USS Guardfish, a submarine charged with intelligence gathering and tracking other submarines.

"We were gone 60 to 70 days at a time and weren't able to tell our families when we were leaving and when we were coming home," said Dr. Till. "We had incredible camaraderie and I learned a lot about true leadership. My experiences on the Guardfish were probably the most important influences on my career. I learned not to watch just gauges, but to learn a systems approach to how everyone and everything works and fits together."

Serving on a nuclear submarine piqued Dr. Till's interest in health physics. When the time came to decide whether or not to continue on active military duty, he decided he wanted to go to graduate



Tom Hinton, Ward Whicker, Helen Grogan, John Till, and Till's son, John, after climbing Mount Rainer, 2000.

school to learn more about how radiation affects people. Looking to combine an interest in radioactive materials and the environment, Dr. Till applied to and was accepted at the then-Department of Radiology at Colorado State University. He maintained his connection with the Navy by joining the U.S. Naval Reserve.

"What a huge change this was for me and my family," said Dr. Till. "For nine years I had led a very structured life in the military and now I had this incredible freedom in graduate school. Faculty members like Ward Whicker, Bill Dewey, and Jim Johnson had created an almost family-like environment and it was a fantastic experience. While working on my master's degree, with Bill Dewey's encouragement, I began to think about a Ph.D."

After graduating from Colorado State in 1972, Dr. Till attended Georgia Tech where he enrolled in their doctoral program in nuclear engineering. While still in school, he was offered an opportunity to work at the Oak Ridge National Laboratory in Tennessee, and was able to accept a position there while finishing up his graduate work. His life took a strange turn at this point.

"I finished up my doctorate in 1976 and, unfortunately, at about the same time the family farm was unraveling," said Dr. Till. "This is when my wife and friends thought I was nuts. My grandmother and two of my uncles were still alive and I wanted to save the farm so they could continue to live on it. This farm had been in our family for several generations and I just couldn't let all the hard work of my family disintegrate."

Dr. Till's wife, Susan, supported his decision. In 1977, the family moved to rural South Carolina, near Orangeburg, and a dairy farm that was on its last legs. The first two years were very difficult and the family didn't know if it would be able to save what was once the pride and joy of the Till family. But they persevered, modernizing the dairy, renovating buildings, reclaiming land, and providing a safe and secure home for the elderly Tills. After the deaths of his elderly relatives, Dr. Till decided to convert from a dairy operation to crops, growing mostly corn and soybeans. One of the greatest days of his life, notes Dr. Till, is the day in 1990 when he sold the last of 864 dairy cows.

*Dr. Till served as a Rear Admiral, owned and operated a 1,000-acre farm, and founded Risk Assessment Corporation.*

## ERHS Welcomes Three New Faculty Members



*From left, new faculty members Lesley Butler, Elissa Randall, and Alejandro Valdes-Martinez*

But the farm had not kept Dr. Till from his career in radiobiology. After moving to the farm, he continued to work part time for Oak Ridge and, also in 1977, founded Risk Assessment Corporation. Since its formation, RAC has played a key role in the evolution of methodologies for environmental risk analysis. Through RAC, Dr. Till has been responsible for a number of major research projects during the past 30 years. These include Chairman of the Technical Steering Panel for the Hanford Environmental Dose Reconstruction Project; principal investigator in the successful completion of the Fernald Feed Materials Production Center Historical Dose Reconstruction Project; Phase II of the Rocky Flats Plant Dose Reconstruction Project; and Phases I and II of the Savannah River Site Dose Reconstruction Projects. He also was principal investigator for “Analysis of Exposure and Risks to the Public from Radionuclides and Chemicals Released by the Cerro Grande Fire at Los Alamos,” and “An Independent Calculation of Soil Action Levels for Cleanup at Rocky Flats.”

RAC’s current work focuses on developing tools for risk analysis for chemicals and radioactive materials released to the environment at Los Alamos National Laboratory. The process is called RACER (Risk Analysis, Communication, Evaluation, and Reduction), and it is being applied in areas where decision makers need immediate access to environmental data for estimating human health risk. Dr. Till works cooperatively with Dr. Ward Whicker, a Professor in ERHS, on the RACER project.

Dr. Till also continued his military service, often flying back home after a consulting trip for a quick change of clothes before reporting to duty. In 1999, he retired as Rear Admiral in the U.S. Naval Reserves. For his military and civilian work, Dr. Till is the recipient of numerous honors including the Distinguished Service Medal, the Legion of Merit, two Navy Meritorious Service Medals, two Navy Commendation Medals, and the Navy Achievement Medal. He also is the 1995 recipient of the E.O. Lawrence Award from the Department of Energy in the field of Environmental Science and Technology. He was selected for this honor for his work in public involvement and research in dose reconstruction. He has been published in numerous scientific journals and his most recent book, *Radiological Risk Assessment and Environmental Analysis*, was published by Oxford University Press. Recent scientific responsibilities include membership on the International Commission on Radiological Protection (ICRP), and chairman of the National Academy of Sciences Committee to Review the Dose Reconstruction Program of the Defense Threat Nuclear Agency.

Today, Dr. Till has established a trust to protect the family farm so that it will always be preserved. RAC, with its team of researchers, continues to work on radiation and chemical risk assessment projects across the country. Dr. Till says he has been lucky in life and had lots of good fortune, including the influence of amazing people who helped him chart a course through submarine school and hazardous waste sites and tranquil farm fields. It reminds one of the old saying that the harder people work, the luckier they get. For a man who has managed to not only pursue but succeed by any standards in all three of his chosen fields, it doesn’t get any luckier than that.

The Department of Environmental and Radiological Health Sciences is pleased to welcome two new radiologists and a cancer epidemiologist to the faculty as assistant professors. Dr. Lesley Butler will join the Epidemiology Section on Nov. 1, while Drs. Elissa Randall and Alejandro Valdes-Martinez will join the Veterinary Diagnostic Radiology team on Oct. 1 and Nov. 1, respectively.

Dr. Randall comes to Colorado State University from the College of Veterinary Medicine at Michigan State University where she was an Assistant Professor in Diagnostic Imaging. Dr. Randall attended the University of North Carolina, Chapel Hill, for her undergraduate work then went on to receive her D.V.M. in 2001 from the Virginia-Maryland Regional College of Veterinary Medicine. She entered private practice for a year before returning to school for graduate work. Dr. Randall received her master’s degree from the Department of Environmental and Radiological Health Sciences at Colorado State University in 2005, and also completed a residency in radiology. In 2005, she became a Diplomate in the American College of Veterinary Radiology.

Dr. Valdes-Martinez most recently was at the University of Pennsylvania, School of Veterinary Medicine, where he completed a radiology residency in July. Dr. Valdes-Martinez is a graduate of the veterinary program at Universidad Autónoma de Nuevo León in Monterrey, Mexico. He then worked as a veterinary assistant before completing an externship in equine medicine and surgery at the University of California, Davis. He joined the staff at San Luis Rey Equine Hospital in California, before moving to Louisiana State University to complete an internship and clinical training in equine medicine and surgery. In 2005, Dr. Valdes-Martinez began his radiology residency at the University of Pennsylvania.

Dr. Butler comes to Colorado State University from the University of California, Davis, where she was an Assistant Professor (Special) of Epidemiology in the Department of Public Health Sciences. She received her master’s and doctorate’s degrees from the University of North Carolina, Chapel Hill, in epidemiology then joined the National Institute of Environmental Health Sciences in 2001 as a postdoctoral fellow. She had been at UC Davis since 2003.

We welcome Dr. Butler, Dr. Valdes-Martinez, and Dr. Randall to the ERHS community, Colorado State University, and Fort Collins and wish them the best of luck in their new positions.

# STUDENT PROFILE

## ERHS Student Takes the High Road with a “Greasel”



Dan Gorum and his “greasel” Mercedes.

To look at Dan Gorum’s 30-year-old Mercedes Benz, you wouldn’t think that you are in the presence of somewhat of an engineering marvel. From the outside, the basic sedan looks like any other conservative 1978 240D. But pop the trunk, and you’ll immediately notice the extra fuel tank and the faint aroma of ... French fries?

“Alternative fuels have come to the forefront in recent months as gas prices escalate, concerns over global warming grow, and the green economy develops,” said Dan Gorum, an undergraduate student in the Department of Environmental and Radiological Health Sciences. “Waste vegetable oil is just one of a number of viable alternatives as we try to figure out all the pieces of the next generation of energy sources.”

Most waste vegetable oil, like that recycled from restaurant operations, is converted to biodiesel by using a catalyst to remove glycerin. Processors want to remove glycerin because if put in the engine glycerin will harden and build up on injectors (glycerin thickens once temperatures hit below 60 degrees Fahrenheit). The processed biodiesel is then blended with diesel to use for fuel. A common ratio is 20 percent biodiesel to 80 percent diesel. Gorum has converted his car to run on straight vegetable oil by converting the car, rather than the oil.

“My car has a second tank in the trunk, as well as the diesel tank from the factory,” said Gorum. “I solve the glycerin problem by heating the veggie oil first, and then running it through the engine. I start the car on diesel, warm it up for a minute or so, and then switch to veggie oil. When I get close to my destination, I purge the veggie oil and switch back to diesel. The valves are installed with switches that send the oil back to the tank so that when I stop and turn off the car, only diesel fuel is in the fuel system.”

Using his converted car, Gorum fills up his diesel tank every 4,000 to 9,000 miles (depending on number and length of trips). When using diesel, he averages 30 mpg, while veggie oil nets 28 or 29 mpg. The



The converted vehicle runs on waste vegetable oil and diesel.

free veggie oil does require filtering – once when Gorum receives the oil and a second time in the veggie oil system, when the oil is taken down to five microns. Environmentally, his car helps in two important ways. First, the car has 80 percent less emissions than diesel (no black cloud out the tailpipe), with emission levels not even registering on state-certified testing equipment. He also is recycling waste oil from area restaurants, some of which he contracts with to pick up waste oil on a regular basis.

Gorum, who has lived in Fort Collins most of his life, didn’t start out to be a green-energy pioneer. After high school, he worked random jobs, including carpentry and fixing cars. While employed at a local garage, he worked on a car that had been converted to run on biodiesel and he became intrigued. Trawling websites and books and participating in an active online community, Gorum taught himself what he needed to know to buy and convert his own car. Two years ago, he purchased his diesel Mercedes and set about converting it to a “greasel” Mercedes. He also decided it was time to go back to school. He attended Front Range Community College for two years, and graduated with an associate’s degree in science. A friend encouraged him to continue his education and check out the environmental health program at Colorado State University. After some fact-finding missions, Gorum concluded it was “totally up my alley.”

This fall, Gorum began his undergraduate program in environmental health, with an interest in air and water quality. He’s also continuing to dabble in alternative fuels, including making upgrades to his own vehicle. He plans to add solar panels to charge a battery to keep the veggie fuel warm when his vehicle is parked outside. His future plans include the conversion of a four-wheel drive vehicle, as well as the establishment of a veggie oil cooperative to encourage more recycling. As far as that faint odor of French fries? Gorum said he doesn’t really notice it.

To learn more about Gorum’s biodiesel projects, as well as see photos of his converted vehicle, visit his Web site at [www.greasediesel.org](http://www.greasediesel.org).

# Colorado School of Public Health Welcomes First Students

Colorado State University's new public health graduate program has opened its doors to its first contingent of students and welcomed a new era in public health education in the state of Colorado.

Colorado State's graduate degree program is integrated with the Colorado School of Public Health, which includes the University of Colorado-Denver health sciences programs and the University of Northern Colorado's community health units. Students will be able to draw from the resources of all three campuses in completing a master of public health degree.

"In this region, there was a great need for a public health school," said Dr. Stephen Reynolds, a Professor in the Department of Environmental and Radiological Health Sciences and member of the strategic planning committee to establish the school. "We see major public health concerns with respiratory diseases, especially childhood asthma, diabetes, obesity, and rural health issues. While Colorado has a strong medical community to care for the individual, what we lacked was a public health educational program to help us develop the personnel resources for preventive medicine in populations."

In 2002, the Colorado Public Health Education and Research Advisory Committee was formed to determine the state's needs in public health education and research. Dr. John Reif, a Professor in ERHS and strategic planning committee member, also has played a vital role in the development of the Colorado School of Public Health.

Dr. Lorann Stallones, an epidemiologist in Colorado State's Department of Psychology, has been appointed director of the Graduate Program in Public Health at Colorado State, which draws expertise from six member departments and faculty from others. Dr. Richard F. Hamman of the University of Colorado-Denver has been appointed founding dean of the school. "We've laid the groundwork for an exciting academic and professional venture," Stallones said. "We invite other CSU partners to join us in building teaching, research, and outreach value into the program."



*Dr. Stephen Reynolds*

The Colorado State program offers master's students six emphasis areas, including Environmental and Occupational Health, Epidemiology, Health and Exercise Science, Global Health and Human Disparities, Health Communication, and Public Health Nutrition. The school also offers the opportunity for eligible students to complete the Master of Public Health and Doctor of Veterinary Medicine in tandem.

The new school will support students, practitioners, and communities with access to educational programs, innovative research and community services. For more information about the school and courses offered, visit <http://publichealth.ucdenver.edu>.

## Health Physics Course Receives Continuing Education Award

The nation's first online-delivered Certified Health Physics (CHP) course earned an honorable mention award (second place) from the University Continuing Education Association in a September conference of the UCEA Great Plains Region.

The course was taught by Dr. Tom Johnson, Assistant Professor in the Department of Environmental and Radiological Health Sciences. The Colorado State University student branch of the Health Physics Society supported the course, and graduate students delivered many of the lectures and presentations.

The CHP review course was recognized for its innovative method of delivery. The course was taught over 17 weeks, with a two-hour lecture streamed via the Internet each week and an iPod download of each presentation. Online interaction was available both live during the class and throughout each week following the presentation. More than 50 distance participants, mostly industry professionals, were spread across the United States and the world making this an international course.

Colorado State students served as mentors to distance students taking the class, tracking the progress of each person throughout the course. Participants took Part One quizzes on specific topics each week, answering a total of more than 500 questions, all of which were graded online. Participants also were able to take subject-specific Part Two exams and review detailed answers for each question.

Dr. Johnson noted that health physics graduate students found that the review class helped to reinforce health physics concepts and provided them a chance to use the skills they learned in their coursework. Reviews from participants were uniformly positive, with the course generating a waiting list for the next offering.

## ACGIH Announces Results of 2008 Election for the Board of Directors

Members of the American Conference of Governmental Industrial Hygienists have elected Stephen J. Reynolds, Ph.D., CIH, to the position of Vice Chair-Elect. He began his four-year term on Jan. 1, 2008. Dr. Reynolds is a Professor in the Department of Environmental and Radiological Health Sciences at Colorado State University. Dr. Reynolds joined ACGIH in 1995.

ACGIH is a member-based organization that advances occupational and environmental health. ACGIH is one of the industry's leading publications resources, with approximately 400 titles relative to occupational and environmental health and safety, including the Threshold Limit Values and Biological Exposure Indices guidelines. For more information, visit the ACGIH website at [www.acgih.org](http://www.acgih.org).



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