Cancer Biology Group’s NASA Grant Supports Research to Increase Safety of Space Travel

When the fictional starship Enterprise endeavored “to boldly go where no man has gone before” the risks of space flight were pretty apparent – Klingons, space monsters, intergalactic battles, and whatever other calamities the show’s writers could imagine. Even in the real world, public attention on the dangers of space travel is focused on catastrophic events that may occur at lift-off or at re-entry and landing. The idea of unseen risks, like those associated with long-term exposure to the highly energetic radiation particles found in space, is relatively novel to most people.

To begin to understand this risk, in 2003 the National Aeronautics and Space Administration (NASA) awarded a five-year, $9.7 million grant to the Cancer Biology Group to study the effects of cosmic galactic radiation on living systems. The Cancer Biology Group, based in the Department of Environmental and Radiological Health Sciences at Colorado State University, is partnering with research teams at the M.D. Anderson Cancer Center, Houston; U.T. Southwestern Medical Center, Dallas; and Baylor College of Medicine, Houston.

In particular, scientists are looking at the increased risk of developing acute myeloid leukemia (AML) with radiation exposure. Dr. Robert Ullrich, Director of the Cancer Biology Group and a Professor in the Department of Environmental and Radiological Health Sciences (ERHS) is the principal investigator on the grant. Other investigators on the project are Dr. Joel Bedford, a Professor in ERHS; Dr. Susan Bailey, an Assistant Professor in ERHS; Dr. Andrew Ray, an Associate Professor in ERHS; and Drs. Yuanlin Peng and Paula Genik, both Research Associates in ERHS.

“We don’t have cosmic galactic radiation on earth – the earth’s magnetic field deflects these particles – so we don’t know what the health effects might be. Humans are simply not used to this type of exposure,” said Dr. Mike Weil, an Associate Professor in ERHS and researcher on the NASA grant. “When you look at missions to Mars, astronauts could be in interplanetary space and on the Martian surface for 30 to 36 months and will...
Welcome

I’d like to first welcome to campus our new students, faculty and staff, as well as welcome back those returning from summer break. This has been a busy summer and fall for the Department and I’d like to bring you up to date on several developments and some new programs in the works.

The Department of Environmental and Radiological Health Sciences is proud to announce that we are in the process of obtaining accreditation for our Master’s of Science degree program in Health Physics. We had a site visit from the Accreditation Board for Engineering and Technology (ABET) in September and hope to get the official word from ABET next June. We will be one of only six universities in the United States with this accreditation.

As many of you know, concerns are rising over global warming, the availability of oil and the resulting potential for conflict over energy sources. Countries around the world are looking more and more toward nuclear power as a way to break free from the stranglehold fossil fuels have on global economies. Experts within the U.S. nuclear power industry, which has been virtually frozen since the Three Mile Island accident in 1979, believe the first new order for a nuclear power plant is only two years away. Congress paved the way for a resurgence in nuclear power with the 2005 energy bill, which gave tax credits worth $3.1 billion, along with liability protection and compensation for legislative delays, to the nuclear industry.

But to operate safely, nuclear power plants need well-trained and highly qualified health physicists. Unfortunately, just as the industry is ramping up, many health physicists in the United States are reaching retirement age and few universities have programs in health physics that will graduate students to replace them (most existing programs were collapsed or consolidated). To compound the problem, the use of radiation sources in medicine, research and industry also is rapidly increasing, creating additional demand for health physicists. Only a few universities in the United States offer graduate programs in health physics, so our new Health Physics graduate degree will be an exciting opportunity for Colorado State University to lead the way nationally, instituting a program that our country desperately needs.

In other news, we are in the process of applying to become a National Institute of Safety and Health (NIOSH) Education and Research Center in partnership with the University of Colorado – Denver, and the National Jewish Medical and Research Center in Denver. If approved, our program will be one of 10 in the nation to receive funding that will provide stipends for graduate students in industrial hygiene, health physics, epidemiology and occupational health; and receive program development funds as well as research dollars. We also are partnering with the Department of Psychology at Colorado State University in this endeavor. NIOSH will be at Colorado State in early 2007 for a site visit, and we expect to hear news regarding our application following that visit.

Members of our faculty within the Cancer Biology Group also are hard at work on an application for selection as a new Colorado State University Supercluster. The designation provides programs with additional institutional support ($200,000-$400,000 annually), and gives programs greater leverage to obtain external funding and incorporate international research components as consistent with the program’s research focus. The Superclusters are in support of Goal 22 of CSU’s Strategic Plan “Setting the Standard for the 21st Century: Strategic Directions.” Pre-proposals are due in October, with final Supercluster selections announced in the spring.

These three projects, along with existing programs within the Department, are creating an air of excitement as we look to new opportunities in which our faculty, staff and students can excel. We will keep you apprised of any news. Meanwhile, I hope everyone has a wonderful fall and I look forward to seeing you soon.

Best Regards,

John D. Zimbrick, PhD
Professor and Head
Department of Environmental and Radiological Health Sciences
be bombarded by particles so energetic that NASA can’t design shielding to protect them. So, we need to understand risks.”

And, though the study is funded by NASA, non-space venturing humans stand to benefit as well as researchers develop a greater understanding of AML and the risk factors that may contribute to development of the disease. This may help advance treatment for the thousands of Americans afflicted with AML. In 2006 there will be about 35,070 new cases of leukemia in the United States, with about 11,930 of those being AML. In 2006, there will be about 9,040 deaths from AML in the United States. Risk factors for AML include smoking, long-term exposures to high levels of benzene (usually workplace associated), and high-dose radiation exposure (bomb blasts or nuclear accidents). In addition, patients with other cancers who are treated with certain chemotherapy drugs are more likely to develop AML. Combining these drugs with radiation therapy further increases the risk.

“We know AML can be induced by radiation and we know that it shows up quickly, often in two to three years, unlike other cancers that can take 15 to 30 years to develop,” said Dr. Weil. “For astronauts, that may mean an increased risk of developing cancer at 48, rather than 78. Because we have cancer incidence data from studies on the Japanese atomic bomb survivors, we have developed a good measure of risk of AML from gamma radiation, but we don’t know the risk from cosmic radiation exposure over a long period of time.”

Since cosmic galactic radiation doesn’t occur naturally on earth, the first thing CSU researchers needed was a source. The NASA Space Radiation Laboratory (NSRL) at the Brookhaven National Laboratory in New York is one of the few facilities in the world that can simulate the harsh cosmic and solar radiation environment found in space. NSRL uses beams of heavy ions extracted from Brookhaven’s Booster accelerator, the best in the United States for radiobiology studies. Working with specific strains of mice, including humanized mice that have had mouse bone marrow replaced with human bone marrow, Dr. Weil’s team is able to expose the mice to heavy ion radiation. These strains of mice develop an AML that is almost identical to human AML, and also have a similar dose response when exposed to gamma radiation.

“We are determining if heavy ion radiation is more efficient, the same, or less efficient than gamma radiation at causing cancer,” said Dr. Weil. “Part of our study includes irradiating mice with different doses, and then following them throughout their lives to see if and when they develop AML.”

In the humanized mice, researchers are looking for types of chromosome damage, including mutations or breaks, in the human bone marrow that is indicative of AML. In other associated projects, researchers are trying to determine if the AML caused by gamma radiation is the same as AML caused by cosmic radiation; how much cosmic radiation is the leukemogenic equivalent of gamma radiation; how to determine if the resulting tumors are the same at a molecular level; and the effects of low-level radiation exposure over long periods of time. In addition, the research team is working cooperatively with the M.D. Anderson Cancer Center to determine the locations of chromosome deletions in AMLs that arise in cancer patients following radiotherapy.

“The more we can find out, the better we will be able not only to protect our astronauts but better care for cancer patients,” said Dr. Weil. “We want to find out if there are genetic variations that make some people more susceptible to radiation damage than others.”

Scientists in the Cancer Biology Group hope the answers they uncover, in addition to making space flight safer, may one day help physicians to customize an individual’s cancer therapy according to their unique set of genetic and environmental risk factors, giving their patients the greatest chance possible to “live long and prosper.”
Internships Provide Students Real-World Experiences that can Cement (or Change) Career Choices

Before Sarah Smith, or Adam Zandman-Zeman or Sara Hattman or any other student can graduate from the undergraduate program in Environmental Health, they have to complete an internship for EH 487. It’s not just for fun, either, as many internships wind up as full-time jobs for the students upon graduation or, at the very least, make for an impressive start to a resume.

“In their junior year, our students take a pre-internship seminar where they learn to write resumes and cover letters, participate in mock interviews, and learn to network,” said Erin Reichert, Undergraduate Education Coordinator and Advisor for Environmental Health. “They then have a full year to set up an official internship which meets the academic criteria and matches the student’s career goals. We have about 50 internship sites, and students also can set up programs on their own with guidance from their advisor.”

Although most internships take place during the summer months, (though most students attend graduation in May, they formally graduate in August upon completion of their internship) companies local to Northern Colorado sometimes offer internships during the academic year. Most internships are paid, though some organizations – particularly non-profit and government – offer excellent unpaid internships.

If that is the case, noted Reichert, students and their advisors will try to find funding elsewhere to cover some costs. In Smith’s case, because her internship was in Africa with the non-profit Cape Leopard Trust and her costs were not covered, the Environmental Health Student Association paid for necessary vaccinations while the Colorado Environmental Health Association paid for her travel expenses.

Both Hattman and Zandman-Zeman (who is double majoring in Microbiology) were in paid internships. Hattman worked at the Platte River Power Authority on an avian influenza emergency preparedness plan (work she is continuing), while Adam Zandman-Zeman completed an internship at the Centers for Disease Control and Prevention in Atlanta. Zandman-Zeman was involved in the Public Health Service where he participated in restaurant investigations, including health evaluations of restaurants on cruise ships.

“Our students have a wide variety of internships from which to choose, but we are always looking for new experiences and encourage organizations to contact us if they think they might have an opportunity for one of our students,” said Reichert. “The best time to be thinking about internships for next summer is right now. We encourage companies to plan early for summer internships. They should be contacting us by January. In 2006, we placed 20 interns but there was demand for more. Let us know about your opportunities early on so we can let our students know their options.”

For more information on the Environmental Health Student Internship Program contact Reichert at erin.reichert@colostate.edu or (970) 491-7910.

Department Prepares to Ramp Up Recruiting Efforts as University Changes Curriculum Requirements

Many students in the Department of Environmental and Radiological Health Sciences didn’t find out about the Department until they took a course in health and wellness as required by the University’s core curriculum. One course offered that fulfills that requirement is EH110, taught by Dr. David Gilkey. The course exposes more than 300 students a year to Environmental Health and a number of those students decide to declare a major, or change their major, to the field.

But, as the University’s core curriculum is changing and the health and wellness component is being dropped, a good pool of potential students is drying up and the Department must look elsewhere.

“Right now, we have approximately 75 students in our undergraduate program in Environmental Health and 40 percent of those will be graduating in the spring,” said Erin Reichert, Undergraduate Education Coordinator and Advisor for Environmental Health. “If we want to grow our program, and we’d like to grow to between 100 and 125 students, we need to expand our recruiting efforts.”

Reichert said the Department is primarily tapping into two populations, life science and biomedical science open option students.

The Department sends students a letter when they are admitted to Colorado State University, telling about the Environmental Health Program and the degree, as well as promoting small class size and great career opportunities. Reichert and Dr. Gilkey also are working with the advocacy offices on campus to create awareness about environmental health in an effort to increase diversity recruitment.

The Department Web site also will be revamped to feature recruiting tools. Future plans include tapping into high school counselors to get the word out, a memorandum of understanding with the Front Range Community College to allow students there to attend environmental health classes at Colorado State, more active involvement in recruiting and academic fairs, and working with alums to create awareness about careers in environmental health.

“We have a truly great undergraduate program here, but we really need to do a better job of getting the word out,” said Reichert. “There are so many positives we can be talking about to potential students. I think that once we reach them, once we create awareness about the environmental health undergraduate degree and the amazing career opportunities it affords, the program will sell itself."
African Adventures Make Internship Experience of a Lifetime

When Sarah Smith was in South Africa this summer working as an intern for the Cape Leopard Trust, she frequently sent back e-mails to family and friends detailing her daily experiences. Of course, a few experiences she wisely decided not to tell her family about until she was safely home. Like the close encounter with a black spitting cobra or the attack by a troop of baboons. Some things are better left unsaid, especially where worried parents are involved.

Even with what some would consider a few near-death experiences, Smith’s educational experience was beyond what she imagined it could be when she first e-mailed the Cape Leopard Trust inquiring about possible projects they may have for an intern.

“I needed an internship in epidemiology and was interested in going to another country, especially somewhere in Africa,” said Smith. “I did some research and sent out a bunch of e-mails to organizations that I thought might have something for me. I gave a synopsis of environmental health and my interests. Cape Leopard Trust in South Africa got back to me right away and said they’d come up with a project for me to work on and get back in touch. I was very excited because, looking at their Web site, they did a lot with research and education.”

Smith’s project was a study to determine why one of the leopard’s main prey species, the rock hyrax (known locally as a dassie), was dying off. Smith made arrangements for her 10-week internship. Erin Reichert, Undergraduate Education Coordinator and Advisor for Environmental Health, worked closely with the director of the Cape Leopard Trust to ensure all went well and soon Smith was settled in at the Cape Leopard Trust’s research station in the Cederberg Mountains, four hours northeast of Cape Town. Her days were spent hiking on rough terrain setting and checking traps for the dassies, as well as working with a leopard capture team. During her time there, the team captured three leopards which where then sampled and radio-collared. The dassie project, however, was not going as well. The leopards, elusive and rare, she got to experience firsthand. Dassies, hanging out on rocks and common, proved to be the more difficult quarry.

“The traps didn’t really work and I had not caught a single dassie,” said Smith. “The people there began to feel bad for me, so they collected two dassies using what’s nicely called destructive sampling. I was really conflicted, but when I performed a necropsy on the first specimen, a pregnant female, it was amazing. She had abscesses throughout her body and appeared to be suffering from a very virulent strain of tuberculosis. It’s likely she would have died before giving birth.”

Tuberculosis in rock hyrax had only been written about in medical journals once before, and that was in a captive zoo population. The disease had never been documented in a wild population before. Smith feels she may have the answer to the question of what is killing the dassies, but results from pathology tests are still in process. Her hypothesis is that because females are immune-compromised when pregnant, the tuberculosis can run unchecked and become systemic, where it would normally not be such a big problem. If pregnant females are dying, that would at least in part explain the population die-off. Rock dassies, despite looking like oversized prairie dogs, are actually the closest relative to elephants, and have gestation periods of seven months meaning the loss of a pregnant female is a major blow to the population. Smith eventually plans to publish a paper and hopes to one day continue her work in South Africa.

“My internship really cemented for me my desire to go into epidemiology, the only problem now is that because of the internship, I have to make some very tough choices,” Smith said. The Cape Leopard Trust would like to have Smith continue her work with the dassies, and use it for a master’s thesis. She also has a job offer from a gorilla research organization in Gabon. But Smith has applied to veterinary school, and would like to complete her veterinary degree before returning to Africa to work again.

“My experience there was so amazing; I get homesick for Africa and can’t wait to go back again,” Smith said. “But I would like to return as a veterinarian, when I would be able to do so much more. There is only one veterinary school in all of South Africa, and very few veterinarians. They are paid so poorly that many move to Canada to practice there.”

So, for now, the Dassie Girl, as Smith was known to the locals, will hope to be admitted to veterinary school, complete her degree, and return to Africa with new skills and abilities. The spitting cobras and baboons will just have to wait.

Smith has a presentation about her experiences with the dassies in South Africa. If you would like her to present to your group, contact her at sgds@colostate.edu
Radiology Program Reaccredited

The American College of Veterinary Radiology (ACVR) Residency Program at Colorado State University was re-accredited following unanimous recommendation by the Residency Standards and Evaluation Committee and subsequent Executive Council approval. The accreditation is for three years, from Jan. 1, 2007, through Dec. 31, 2009.

In his letter to Dr. Richard Park, ACVR Radiology Residency Director in the Department of Environmental and Radiological Health Sciences, Dr. John S. Mattoon, President of ACVR, wrote, “Congratulations on having one of the ACVR’s finest Accredited Radiology Residency Programs. Colorado State’s program under your guidance is a model for all to follow.”

Dr. Joel Bedford to Receive Radiation Research Society Excellence in Mentoring Award

Dr. Joel Bedford, a Professor in the Department of Environmental and Radiological Health Sciences, has been selected by the Radiation Research Society to receive the organization’s Excellence in Mentoring Award. Dr. Bedford is the fourth recipient of the award, which was established in 2002.

The Radiation Research Society (RRS) requested letters of nomination for the award, which were reviewed by a 10-member panel charged with selecting the recipient. Dr. Bedford will receive the Excellence in Mentoring Award during the business meeting of the RRS in Philadelphia, Penn., at the organization’s 53rd Annual Meeting to be held jointly November 5-8 with the American Society for Therapeutic Radiology and Oncology.

Dr. Bedford became interested in radiological sciences after graduating from the University of Colorado with a degree in chemistry. He then worked in the Biochemistry Department at the University of Colorado’s Health Sciences Center and eventually enrolled in the master’s program in radiology. After completing his master’s degree, he went to Oxford where he completed his PhD in 1966, studying radiation effects.

Dr. Bedford then returned to the United States where he joined the faculty at Vanderbilt University as an instructor, earning tenure in 1971 as an Associate Professor. In 1975, Dr. Bedford gave up his tenured position for what seemed to be a good opportunity at Colorado State University, a chance to join an entire department devoted to his field of study, the Department of Radiology and Radiation Biology.

Del Sandfort Receives Oliver Pennock Award

Del Sandfort, Director of the Health and Safety Consultation Program housed within the Department of Environmental and Radiological Health Sciences, received the Oliver P. Pennock Distinguished Service Award at Celebrate Colorado State festivities this spring. Sandfort, who is an alumnus (1976, 1982) of Colorado State University, also is an Assistant Professor in the Department.

The award, presented by Colorado State University, recognizes meritorious and outstanding achievement over a five-year period by full-time members of the academic faculty. The award program was established as a tribute to Professor Pennock, who served as a Distinguished Professor of Civil Engineering in the 1920s.

Two ERHS Students Selected for McNair Scholars Program

Two graduate students in the Department of Environmental and Radiological Health Sciences have been selected to receive CSU McNair Graduate Fellowships. The students, Janine Bennett and Phillip Clark, are both working towards their master’s degrees in environmental health.

Colorado State University offers two McNair Graduate Fellowships annually for entering McNair Scholars and McNair-eligible applicants who intend to pursue graduate studies at Colorado State University. The award requires full-time enrollment with an award of $7,500 split disbursement of $3,750 fall 2006 and $3,750 spring 2007, plus a minimum of a quarter-time assistantship with stipend and a tuition payment amount dependent on type of assistantship.

The mission of the McNair Program is to increase the ranks of under-represented populations in graduate programs, particularly in the sciences.
Dr. Richard Park sits in a cramped multi-purpose room at the James L. Voss Veterinary Teaching Hospital (VTH). Radiographs of horses’ legs hang from viewboxes clustered on the surrounding walls like so many windows on a skeletal landscape. He looks on with some bemusement as veterinary students concentrate on computer screens and struggle to understand the clues revealed in images that often seem other-worldly. An air of uncertainty pervades and students frequently seek out Dr. Park for reassurance they are on the right path, confirmation of their findings, or a gentle nudge in a different direction.

“It is so much tougher for students today than when I completed my radiology residency,” notes Dr. Park, who is a Professor in the Department of Environmental and Radiological Health Sciences and Section Head of the Diagnostic Imaging Section at the VTH. “When I came here in 1975, we had one room with an X-ray machine for dogs and a small portable X-ray machine for horses. Radiographs were the only images with which we concerned ourselves. Students today have a lot more on their plate.”

Dr. Park grew up in a small town in central Utah where his family owned a turkey farm and ham was the preferred Thanksgiving dinner – no more turkey, please. He played basketball at Weber State in Ogden before attending Utah State’s pre-veterinary medical program. He applied to the Professional Veterinary Medical Program at Colorado State University in 1964 and began his studies. After graduation in 1968, he was accepted in the radiology residency program at University of California – Davis, where he also completed his PhD.

“When I graduated, specialization was a new concept, but I knew I wanted to focus on something and get on top of it, be at the forefront,” said Dr. Park. “One of our professors, Dr. Joe Morgan, had just taken a job in California when he came into our class and said he’s got ‘what’s called a residency position’ and was anybody interested in checking it out. I talked to him after class, and he signed me on. Today, we take one radiology resident a year and we get around 26 or 27 applicants for that position. It’s quite a different playing field than when I pursued this specialty.”

In 1971, when Dr. Park became board certified, he was one of about 25 veterinary radiologists in the country. After completing his studies, he left UC-Davis to join the faculty at the University of Illinois, and then returned to UC-Davis for a year before joining the faculty at Colorado State University in 1975.

“It’s amazing to look at how far we’ve come in the last 30 years,” said Dr. Park. “Today we have five X-ray rooms, two ultrasound rooms, nuclear medicine, CT scanners, and a state-of-the-art MRI scanner. In the early 1970s, there was a meeting in Chicago with an early CT scanner and people where just drawn to it. For the first time, we could do cross-sectional imaging, letting us look at tissues in a different plane. It changed the face of diagnostic imaging and allowed us to take a giant leap forward in veterinary medicine.”

Areas that Dr. Park particularly enjoys working in today are developing imaging techniques for orthopaedics, particularly in osteoarthritis and subcondral bone density studies; oncology; and neurology, including strokes and other neurological conditions. Much of the imaging research work, said Dr. Park, enables veterinarians to provide advanced diagnosis and treatment of animals while at the same time advancing human medicine to improve human health.

“In orthopaedics, much of the research work we are involved with crosses directly over into human medicine with studies in osteoarthritis and osteoporosis,” said Dr. Park. “Diseases that we treat in the animal population have a direct correlation to the same diseases in the human population.”

In addition to clinical work and research, Dr. Park is actively involved in the Professional Veterinary Medical Program, training tomorrow’s veterinary doctors and biomedical researchers. In his academic role as a professor, he enjoys teaching one-on-one in the clinics, especially working up cases with his students. It’s uniquely gratifying when, Dr. Park says, a student is struggling with a particularly difficult case or concept and Dr. Park sees a light go on when the student “gets it.”

For Dr. Park, diagnostic imaging has introduced him to a world few are able to imagine – a world where things are viewed from the inside out, rather than the outside in. The greatest challenge for him, and one of the greatest joys he notes, is keeping abreast of ever-changing technology that, every year, keeps improving the view.
Interest in Neurotoxicology Leads Researcher to Study Neuronal Workings and Parkinson’s disease

When the phone rings in Dr. Ron Tjalkens’ office, it’s usually one of his students, a fellow faculty member, or a colleague from another institution on the line. Occasionally, though, the voice on the other end belongs to someone who suffers from Parkinson’s disease, a progressive disorder of the central nervous system. These voices bring a sense of immediacy to the research work underway in Dr. Tjalkens’ laboratory and connect real people to the sometimes complex and laborious workings of biomedical research.

For Dr. Tjalkens, an Assistant Professor in the Department of Environmental and Radiological Health Sciences, these voices remind him of the importance of what he does and how, some day, his work and the labors of many others may help the more than 1.5 million Americans who suffer from Parkinson’s disease see advances in treatments and maybe even a cure for the debilitating condition. His work is an extension of an overall interest in medical research that began at the Scripps Research Institute and continues to take him in new directions today.

“I think what really drew me to toxicology was the opportunity to apply basic science to medically relevant problems, and focus my research efforts on important human health issues,” said Dr. Tjalkens. “The course my career has taken since leaving the University of Colorado (where he received his PhD) has further refined my research interests to focus on neurotoxicology, an area that examines the effect of environmental toxins on the central nervous system.”

Dr. Tjalkens joined the faculty of the Department of Environmental and Radiological Health Sciences in 2004, moving his research program as well as some of his graduate students to CSU. Dr. Tjalkens, a toxicologist, came to Colorado State from Texas A&M University where he was an Assistant Professor in the Department of Veterinary Anatomy and Public Health. Originally from California, he completed his undergraduate studies in chemistry at the University of California – San Diego, and received his PhD in toxicology from the School of Pharmacy at the University of Colorado Health Sciences Center. He was a postdoctoral fellow in neurotoxicology at the School of Public Health, University of Michigan. In 2001, he joined the Faculty of Texas A&M.

Dr. Tjalkens’ research focus when he came to Colorado State was manganese neurotoxicity. There is some evidence that exposure to certain toxins in the environment, including manganese, selectively injures the dopaminergic system and may increase the risk of developing Parkinson’s disease. His other areas of research interest include astrocyte biology and calcium signaling; the development and use of neurotoxic models to study neurological disease processes; mitochondrial dysfunction (especially the impact of energy deprivation) in neurodegenerative disorders; and the molecular regulation of genes that may lead to the inflammatory injury to neurons.

For Dr. Tjalkens and his research team, reminders of the importance of the work they do can be as simple as a voice on a phone, or as emotional as talking with a Parkinson’s disease patient at the University, at church, or in the community. With so many Americans waiting for answers, with so many families hoping for better treatments, and with so many patients hoping even for a cure, the voices grow louder as baby boomers age and the incidence of Parkinson’s is expected to rise in the face of the greatest risk factor of all – growing old.

“I think what really drew me to toxicology was the opportunity to apply basic science to medically relevant problems, and focus my research efforts on important human health issues.”

– Dr. Ron Tjalkens
Researchers Examine Astrocytes as Possible Target of Treatment for Parkinson’s Disease

Parkinson’s disease was first described in 1817 by the English physician, Dr. James Parkinson, who called it “Shaking Palsy” because of the uncontrollable tremors patients exhibited. It wasn’t until the 1960s, mostly thanks to technological advances, that the pathology of the disease began to be understood. Since that time, most Parkinson’s research has focused on the neuron, but that is changing as researchers begin to uncover the importance of another neurological cell group, the astrocytes.

“In the last 10 years, research into astrocytes has greatly increased and these efforts are now at the forefront of Parkinson’s investigations,” said Dr. Ron Tjalkens, an Assistant Professor in the Department of Environmental and Radiological Health Sciences. “In our laboratory, we are studying what happens when cell-to-cell interactions go awry. What if the primary malfunction in Parkinson’s disease is with the astrocyte? If anything happens to the astrocytes that support it, the nerve cell is done. We do know that stress and injury can inflame astrocytes. What we are trying to understand is how inflammatory genes are regulated, what those genes are, and what happens when astrocytes stop supporting neurons and actively participate in their demise. If we can squelch the inflammatory response, maybe we can save the neurons and slow the progression of diseases like Parkinson’s.”

Astrocytes, also known as astrogia, are star-shaped glial cells that have been looked upon by medical science primarily as gap fillers, something to give physical structure to the brain. In the last 10 years, however, research into astrocytes shows these cells act as a support system for neurons, keeping the neuronal network healthy and functioning. Recent experimental results have suggested that glial cells play a vital role in information processing among neurons, indicating that neurons may not be the sole information processing cells in the nervous system. In fact, there are far more astrocytes in the brain compared with neurons (a 10-to-1 ratio).

“Basic life support for neurons is farmed out to the surrounding functional unit – the astrocyte,” said Dr. Tjalkens. “These cells provide metabolic intermediates and antioxidants. They modulate communication and take up neurotransmitters. As our knowledge develops, we are examining the role astrocytes may play in the development of Parkinson’s disease and hoping to determine if these cells offer new potential targets for treatment.”

Parkinson’s disease is a progressive disorder of the central nervous system affecting more than 1.5 million people in the United States. The disease is characterized by a decrease in spontaneous movements, difficulty walking, changes in posture, rigidity, and tremors. Parkinson’s disease is the result of degeneration of neurons in the Substantia Nigra of the brain, decreasing dopamine. Today, the primary treatment for Parkinson’s is the drug levodopa which is converted into dopamine in the brain. Surgical procedures also can treat symptoms, but there is no cure for the disease and no way to prevent the progressive changes in the brain.

In the laboratories of Dr. Tjalkens and Dr. Marie Legare, also an Assistant Professor in the Department of Environmental and Radiological Health Sciences, two projects funded by the National Institutes of Health and by the American Parkinson’s Disease Association (APDA) are helping researchers find answers to the complex questions of neurodegeneration.

“NIH funding is allowing us to study the dietary metal manganese, an essential nutrient in all cells. However, at high levels, manganese accumulates in the brain and produces neuropathological effects similar to those of Parkinson’s disease,” said Dr. Tjalkens. “The causes of Parkinson’s are unclear – only a small fraction appear to be genetic – but manganese is one of a number of environmental toxins that could be a risk factor so we are taking a look at that.”

Drs. Tjalkens and Legare are jointly working on the APDA study that is focusing on different neurotoxic models to study neurological disease processes. The research teams are interested in the energy deprivation of a cell’s mitochondria that occurs with exposure to neurotoxins. Energy deprivation causes susceptible regions of the brain to become impaired. One of the mainstream models for these types of studies is the toxic Parkinson’s-like effect of the chemical MPTP. This model originally developed when it was discovered that six heroin addicts, who rapidly developed Parkinson’s symptoms, had been exposed to MPTP through their drug use.

“The more ways we can come at Parkinson’s disease, the greater our understanding of the causes of and potential treatments for the disease,” said Dr. Tjalkens. “Obviously, the causes are multifactorial including the genetic deck of cards you’re dealt, environment, and age. The questions raised in research suggest that the supporting cells of the brain, such as astrocytes, may be a good target for treatment; that environmental toxins, like manganese in high levels, may increase risk so we need to understand that; and that neurotoxic models, like MPTP, can advance our understanding of how the central nervous system reacts to attacks that can cause inflammation. Preventions or cures for Parkinson’s may be years down the road, but if we can control the progression of the disease – make it a manageable condition in which neurons are protected – well, that’s something more than we have now.”
ERHS Alumna Hits Ground Running with First Job Out of College

Though Aaron Schulte just graduated in December 2005 from Colorado State University and the Department of Environmental and Radiological Health Sciences, she already has gained an immense amount of knowledge in the field of health and safety at the Anheuser-Busch brewery in Columbus, Ohio.

“I was hired by Anheuser-Busch as a health and wellness coordinator, but because the safety manager for the brewery moved on to work for another company shortly after I was hired, I had the opportunity to take on many parts of the safety program,” said Schulte. “Now I’m not only coordinating health and wellness programs and administering the workers compensation program, but have had the opportunity to become knowledgeable about safety issues at the brewery. It’s been a challenge but one of the beautiful parts of my job is that I never have a typical day – it’s never the same thing twice.”

Schulte was first introduced to the concept of health and safety when a safety consultant talked about his job during a career fair while she was in school in Minnesota. She met with him after his presentation, talked some more, and found that environmental health was a fit for her. After researching the field, she decided to transfer to the program at Colorado State University, where she completed her undergraduate degree in 2005. As part of her degree requirements, Schulte needed to have an internship before she graduated.

“T’m really glad that the department has that requirement because if not, I doubt I would have even looked at internships and I certainly wouldn’t be where I am today with Anheuser-Busch,” Schulte said.

During her summer internship at Anheuser-Busch, Schulte worked full time on a recycling project looking at what products were being recycled, including aluminum, glass and recycled resources. In the fall, she continued to work for Anheuser-Busch 20 to 30 hours per week while still attending school. Before she graduated, the company offered her a full-time position at its brewery in Columbus.

“I knew that if the company offered me a job, I would take it,” said Schulte. “It was like having an eight-month interview for both of us. They got to see what I could offer them, and I could see if the company’s culture and programs fit my values.”

In her work today, Schulte does everything from running an employee wellness program (including a fitness center, health fairs, and wellness activities including runs and bike rides), to working as a safety manager ensuring personal protective devices are appropriate and used, fitting and training employees on respirator use, looking for safety concerns in the workplace, and working with employees and managers to maintain a preventive environment to optimize worker health and safety.

“What I really enjoy about working at Anheuser-Busch is that they are at the forefront of prevention,” said Schulte. “They have really focused their efforts on not only creating a safe work environment, but on making their employees responsible for their own health and safety, even including things like stretching exercises to prevent muscle strain and injury. They empower people to make changes in their work environment that will increase the wellness of everyone.”

Schulte attributes her success and job satisfaction to the undergraduate program in environmental health at Colorado State, which, she says, gave her the education and tools she needs to not only be successful in her current job, but prepare her for new opportunities on the horizon.

“Aaron Schulte making safety rounds at the Anheuser-Busch brewery in Columbus, Ohio.

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– Aaron Schulte
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Celebrating 100 Years of Excellence

2007 Marks the College of Veterinary Medicine and Biomedical Sciences’ 100th Anniversary – Celebration to Commence at Annual Conference in January

Although the first veterinary class at the Colorado Agricultural College was listed in the College’s 1879 brochure, it wasn’t until 1907 that the State Board of Agriculture begrudgingly agreed to the creation of the Department of Veterinary Science with Dr. George Glover at the helm. Nearly 100 years of Hope Care Cures later, the College of Veterinary Medicine and Biomedical Sciences is preparing to celebrate its Centennial Anniversary.

“Throughout 2007 we are planning many special events to commemorate the College’s 100th anniversary,” said Dr. Lance Perryman, Dean of the College (Dr. Perryman is the College’s ninth dean in 100 years). “This will not only be a time of celebration, but a time of reflection as we look back on how far we have come, and look forward to what the future holds for us.”

The 100 Year Celebration will kick off at the CVMBS Annual Conference on Jan. 6, 2007, with a Hope Care Cures Centennial Celebration dinner featuring a number of distinctive guests. More information is available on the Hope Care Cures Web page at www.cvmbs.colostate.edu.