INSIGHT

Fall 1998

College of Veterinary Medicine and Biomedical Sciences

Cytogenetics and Cancer

Living the High-Altitude, Low-Oxygen Life

Colorado State University®

INSIGHT

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Cover Photo: This erratic chromosome profile is the telltale sign of cancer from a feline tumor cell. Instead of the normal pairs – X and Y chromosomes excluded – chromosomes here reflect the unstable nature of the tumor cell's genetic material. Inset: Drs. Susan LaRue, Charles Waldren, and Joel Bedford of the cytogenetics group at Colorado State University.

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Hot off the Press!

Welcome to the fall edition of *Insight*. Right off the bat, you may notice a few new things. First of all, the format has changed fairly dramatically. We are more of a magazine-style newsletter now, and we hope that translates into ease of use for all our readers.

Many of the changes in the pages of *Insight* are a direct result of our reader survey conducted in 1997. We had a great response and wish to thank all who participated in that survey. You helped us chart a course for an improved publication that will better meet your needs. Part of the survey dealt with what kinds of stories *Insight* should feature. The top rated categories were research, faculty profiles, and development news. We also got responses that asked for greater coverage of the departments of environmental health and microbiology and more information on continuing education courses.

Survey respondents also made it clear that they expect us to be careful spenders and good stewards of the College's resources. The plain message was that *Insight* needs to be a well-produced newsletter with good stories, strong writing, and clear layout – but don't spend a lot of money! The magazine format we decided upon uses color on the cover but keeps the inside pages black plus one color, saving on print and design costs.

We hope you enjoy the new *Insight*. If you have any questions, comments or suggestions, please send them to:

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Nominations are now being accepted for two of the College's most prestigious honors – admission into the Glover Gallery and selection as a College Honor Alumnus. If you would like to nominate an outstanding individual for either of these honors, please contact the Office of the Dean at (970) 491-7051 or Dr. Anthony Knight at (970) 491-1274 for additional information on the nomination requirements.

Table of Contents

Cytogenetic Studies Offer Cancer Clues

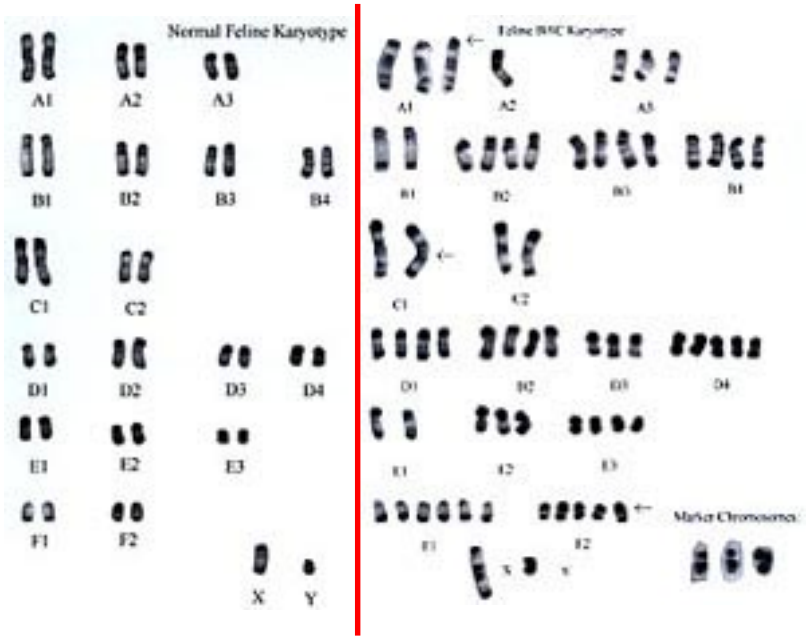
In a fourth-floor laboratory at the Molecular and Radiological Biosciences Building, researchers can barely contain their excitement as they look at a Technicolor photo bearing a striking resemblance to tie-died worms. The "worms" actually are canine chromosomes, and for the first time, researchers believe they have identified all 78 of the dog chromosomes. It's an important step forward in the field of animal cytogenetics, a step that one day may help veterinarians better diagnose, treat, and cure cancer, the leading cause of death in companion animals.

Researchers with the cytogenetics group at Colorado State University's College of Veterinary Medicine and Biomedical Sciences know they have just started their journey of discovery into the world of cell genetics. While cytogenetic techniques and research have been well developed for the study of human chromosomes, these techniques have less often been applied to the study of animals. The challenge now is to develop these techniques for application to animals and to expand the base of knowledge. The goal is to positively impact both animal and human medicine.

Cytogenetics starts with the study of chromosomes, the cell structures into which DNA – the blueprint for all life – is packed. Amazingly enough, about six feet of DNA is stuffed into each cell. Humans have 46 chromosomes, dogs 78, and cats 40. Dr. Charles Waldren, a professor in the Department of Radiological Health Sciences, likens DNA strands to a cassette. Genes are strung along the chromosome like songs on a tape in a linear arrangement. Each note is a base pair of DNA, and the arrangement of the notes spell out the signal of the gene. In cancer, the notes get changed, sometimes songs are deleted, and the cell goes wildly off key. Cytogenetics is the microscopic study of these chromosomes, both normal and mutated, and the disruptions that occur causing abnormalities that can result in birth defects or genetic diseases like cancer.

Researchers already have a glimpse of what a better understanding of animal cytogenetics may lead to. By looking at genes located on different chromosomes, veterinarians will be able to tag individual animals more or less prone to certain types of cancer. This will help breeders better select animals and reduce the number of pet owners faced with the prospect of cancer in their pet's life. Chromosomes also will help determine the efficacy of options when developing a treatment plan for a companion animal with cancer. For example, certain types of chemotherapy are less effective than others in dogs with three number 13 chromosomes. The presence of these chromosomes could alter decisions about, and outcomes of, an animal's treatment.

"Cytogenetic tools are used extensively in the diagnosis and treatment of human cancer," said Dr. Susan LaRue, an associate professor in the Department of Radiological Health Sciences and a clinician at the Veterinary Teaching Hospital. "We are working to develop the tools to characterize normal cells, then expand these tools to study tumor cells. By understanding animal cytogenetics and using the information contained in chromosomes, we can improve cancer treatment in companion animals. The information gained also can be of benefit to human cancer patients."



The genetic material of two feline cells is compared side-by-side. On the left side are the orderly chromosomes from a normal cell. On the right side are the abnormal chromosomes from a feline tumor cell. The altered chromosomal regions contain or cause mutations in genes, or alter gene expression.

The cytogenetic/cancer fit is a natural at Colorado State. The Veterinary Teaching Hospital is home to the renowned Animal Tumor Center, where a large sampling of animal tumor cells is available to researchers. Pursuing cytogenetic studies in the tumors of pet animals will shed light on the genetic changes and biology of these tumors. Currently, the research group also is characterizing a feline tumor cell line that is derived from a naturally occurring bronchoalveolar carcinoma, a type of lung cancer that occurs in humans as well as cats.

continued on Page 2

Cytogenetic Studies

continued from Page 1

Using fluorescence-based techniques, the research team has the ability to evaluate for recurrent chromosomal changes in other feline tumors. These techniques include a high-resolution, fluorescent R-banding technique; the application of fluorescence in *in situ* hybridizations (FISH); and comparative genomic hybridization (CGH), a multicolor FISH technique used to rapidly screen tumors for numerical aberrations. Using these tools for mapping studies will lead to a greater understanding of animal cytogenetics and will be of diagnostic and prognostic significance.

Dr. Charles Waldren and a research associate review a screen capture of a chromosome grouping.

"Another very important aspect of our work is that spontaneous tumors in dogs and cats have great potential to contribute to understanding carcinogenesis and tumor biology and assist in the development of therapeutic agents for animals and humans," said Dr. Joel Bedford, a professor in the Department of Radiological Health Sciences and member of the cytogenetics study group. "Currently, most cancer studies are conducted in laboratory rats and mice with injected tumor cells. These animals are short-lived, highly inbred, and not representative of the more outbred nature of gene sharing found in the human population.

"Pet animals make a wonderful model for human studies because their population genetics more closely resemble ours. Their cancers are spontaneous and common, and their incidence of cancer increases as they age, similar to humans. Study of animal tumors is particularly informative because pets share the environment and lifestyles of their owners. But in order to conduct comprehensive studies using companion animals as models, we must understand the cell genetics of these animals."

Drs. Waldren, LaRue, and Bedford are working on a number of projects that complement the group's efforts. Dr. Bedford's work focuses on radiation cytogenetics. He studies how radiation and other agents act to produce chromosomal changes that can kill or transform tumor cells. He also studies how genetic instability is produced by radiation. Dr. Waldren, a molecular geneticist, examines the changes that take place in cells that lead to cancer or birth defects. Dr. LaRue is the group's liaison with the Comparative Oncology Group. She procures study materials, is the resident dog and cat tumor expert, helps define study areas, and also is involved in cancer treatment. She currently is funded by the Morris Animal Foundation to study the development of cytogenetics for canine and feline tumors.

> "We are working to develop the tools to characterize normal cells, then expand these tools to study tumor cells."

Drs. Elizabeth McNeil, Russ Drabek, and Alan Christian, all graduate students or fellows with the program, are charged with developing new molecular cytogenetic techniques for application in the field of animal cytogenetics. Their groundbreaking work is leading the way to a better understanding of animal cancers. In the long term, they hope for breakthroughs in veterinary and human medicine that can lead to prevention, improved treatments, and perhaps even a cure for some cancers. The work is complex, slow, and riddled with challenges. But the occasional bright news does surface, like a beacon of light in the dark.

In May, newspaper headlines blared the news of one such beacon – was it a possible cure for cancer? Using a drug combination of angiostatin and endostatin, medical researchers had shown they could tame tumors in mice with astonishing success. Would we at last have an effective weapon against cancer that would kill the disease and not harm the patient?

As quickly as the news spread across the nation, the backlash began. Pharmaceutical stocks, once soaring, came down to earth when reason began to take hold. Laboratory results oftentimes don't equal success in treating human patients. Witness the promise of taxol, interferon, and interleukin-2 – once cancer-cure superstars now relegated to foxhole skirmishes in the war on the nation's second leading cause of death (heart disease still has the dubious honor of being the Number 1 killer). The newest drug therapy, while promising, is still in early animal testing. Whether it will upstage all predecessors remains to be seen. But in laboratories all over the world, the quest to understand, diagnose, and treat cancer continues. Researchers at Colorado State University's cytogenetics group took note of the news and then quickly returned to their work. Those tie-died worms have a lot to teach them and could even hold the master clues they search for as they seek to unravel the mystery of cancer with the help of "man's best friend." ■

Japanese Internship Program a Unique Opportunity

Thanks to the generosity of Dr. Gen Kato, a Japanese veterinarian, a number of senior veterinary students from Colorado State University have enjoyed the opportunity to visit and experience small animal practice in Japan. This International Externship, sponsored by Dr. Kato, has been in place for eight years, enabling eight students to experience the practice of veterinary medicine in a country quite different from their own.

"In 1987, Dr. Kato came to Colorado State as a visiting professor," said Dr. Anthony Knight, head of the Department of Clinical Sciences. "He worked in the small-animal clinic of the Veterinary Teaching Hospital and developed a strong relationship with many of our faculty. Since that time, he has done a great deal to help internationalize our training program at Colorado State."

Dr. Knight said that Dr. Kato has invited many faculty members to go to Japan and present in-depth continuing education programs for Japanese veterinarians. He also has organized groups of Japanese veterinarians to come to Colorado State for continuing education experiences. He has translated into Japanese faculty-authored textbooks, and he initiated and funded an externship program that continues today for veterinary students to visit his veterinary practices in Tokyo.

"Dr. Kato, who served as President of the Japanese Animal Hospital Association, always has advocated the importance of exchanging ideas between cultures and within the international veterinary profession," said Dr. Knight. "He owns two veterinary clinics in Tokyo and believes it is important to make our students aware of the different veterinary practice experiences in Japan."

Each year, a student is selected on a competitive basis for the externship in one of Dr. Kato's veterinary clinics. Dr. Kato underwrites airfare and provides housing and sustenance. Each student's visit lasts between two and four weeks.

Dr. Tamara Moll with Dr. Gen Kato at his practice in Tokyo.

Dr. Catherine Kasai was the most recent student to journey to Tokyo. This past spring she stayed with Dr. Kato and his wife, Maki, and commuted by foot, train, and bus each morning to Dr. Kato's Daktari Animal Hospital. In her report describing her experience, Dr. Kasai was impressed with the quality and efficient use of space in the compact veterinary clinic, which is situated in Tokyo, where space is at a premium.

"In a small area, he has a surgery suite, treatment area, two exam rooms, an isolation area, boarding, grooming, x-ray room, and a fully equipped lab," Dr. Kasai wrote. "He keeps his clinic up-to-date with the addition of an ultrasound machine, a flexible endoscope, and a phenomenal library. The staff was made up of great people including seven doctors, four technicians, and two receptionists. The doctors here performed everything from the physical exam to doing their own differential on a complete blood count – things we as students and clinicians sometimes take for granted."

Dr. Kasai wrote that the externship was well-worth the time and effort she put into it, and she has made lifelong friends and colleagues from her time in Japan. For Dr. Knight, the externship is one more example of how individual experiences such as this can make a difference in a student's life and career.

"We think it's a great opportunity for students to be exposed to a different culture and see how veterinary medicine is practiced in another part of the world," said Dr. Knight. "This externship truly enhances the caliber of our international education. We want to recognize and thank Dr. Kato for his generosity, without which we would be unable to support this program." ■

"It's a great opportunity for students to be exposed to a different culture and see how veterinary medicine is practiced in another part of the world."

VETPREP Program Helps Students Succeed in Veterinary School

In a fair world, all things would be equal. All students would have identical access to financial resources, excellent schools, and supportive families and communities. Cultural barriers to success would be nonexistent, and each student would compete based on his or her own merit. But such is not our world.

The College of Veterinary Medicine and Biomedical Sciences tries to address "opportunity inequality" through a program – VETPREP – that gives disadvantaged students a chance at an even start as they pursue a career in veterinary medicine.

"The goal of the VETPREP program is to provide educational opportunities to disadvantaged students," said Dr. Alan Tucker, the VETPREP program director and head of the Department of Physiology. "Students can be financially, culturally, or educationally disadvantaged, but, given the chance, have a great shot at a veterinary education. VETPREP is designed to recruit and retain these students and provide them the tools they need to be successful."

VETPREP is funded through the Division of Disadvantaged Assistance with the Health Resources Services Administration of the U.S. Department of Health and Human Services. The project is a part of the Health Careers Opportunities Program that provides disadvantaged students avenues into health careers. The program at Colorado State is one of only two nationwide that are focused on veterinary medicine. Faculty members in the Colorado State program are Drs. Tucker, Sherry McConnell, Lee Wilke, Duane Lassen, and Ray Whalen.

> "The goal of the VETPREP program is to provide educational opportunities to disadvantaged students."

Students recruited into the program are solicited from the previous year's Professional Veterinary Program applicants. They are students who were not admitted to the PVM program, but were close. To qualify for VETPREP, students must meet the program's criteria and go through a ranking system based on the program's intent. Dr. Tucker said students also must have a good chance at success. Each year, seven students are selected to join the program. The program currently has 14 students participating in first and second summer programs.

"More than a year long, the program helps students get a firm foundation enabling them to succeed once they begin their veterinary education," Dr. Tucker said. "The first summer is a preparatory session. Students learn study skills, review biochemistry, clinical chemistry, cell biology, microscopy, and basic test-taking skills. They are matched with veterinary student mentors, forming a support network that helps them to focus and do well.

"During the academic year, the students continue to meet and work with faculty members to sustain their academic success. The second summer, before they go to veterinary school, students get early entry overview courses in physiology, gross anatomy, neurobiology, and pathobiology to help them transition into the professional program. We try to simulate parts of the first year veterinary program as closely as we can."

VETPREP students range in age from mid-20s to mid-40s and include individuals coming back for second careers, students returning to finish their education, first-generation students, men and women with families, and students from a variety of other backgrounds. VETPREP helps them to prepare for the challenges of the PVM program so they have the best chance of meeting their ultimate goal – graduating with a DVM degree. ■

Animal Disease Surveillance Forum Held

The second forum on Animal Disease Surveillance and Information Systems for the Americas was held in Bogota, Colombia, March 9-13. The College of Veterinary Medicine and Biomedical Sciences, through its Center for Veterinary Epidemiology and Animal Disease Surveillance Systems, was a co-sponsor. Collaborators included the United Nations Food and Agriculture Organization and the U.S. Department of Agriculture, APHIS.

"The purpose of the forum was to continue developing and harmonizing animal disease surveillance and information systems in the Americas," said Dr. Mo Salman, a professor in the Department of Environmental Health. "The first forum was held in San Salvador, El Salvador, in November 1996, and our College participated in both the design and presentations."

Chief veterinary officers or their representatives from 19 American countries participated in the second forum. More than 100 participants contributed to the presentations and discussion sessions, and several international agencies were represented.

As a result of the forum, regional organizations and chief veterinary officers committed to implement comprehensive animal-disease surveillance systems in their respective countries. Four regions were recognized for implementation of specific surveillance systems to satisfy regional and international requirements. The participants agreed to establish a coordinating committee to follow up on activities. The College was recognized for its leading role in the forum and will be represented on the committee. ■

Living the High-Altitude, Low-Oxygen Life

When Dr. Michael Tamkun, a professor in the Department of Physiology, left Vanderbilt University and the flatlands of Nashville, Tennessee, last year, he was drawn to Colorado State University in part because of its proximity to the Rocky Mountains. The mountains are a source of aesthetic and athletic pleasure to him, but also are intricately connected with his current research projects that involve the study of pulmonary hypertension. Mountains equal altitude, and altitude equals a host of physiological challenges to the mammalian system.

Dr. Michael Tamkun

"I spent the past 10 years studying ion channel structure and function in the heart muscle and uterine muscle," said Dr. Tamkun. "We know that low oxygen inhibits potassium channel function in pulmonary artery vascular myocytes. When I came here, it turned out that people were very interested in the physiology of that problem, and we started working in this area in addition to pursuing our ongoing heart and uterine interests."

Most work in the field has been done with rats, but Dr. Tamkun studies cattle. Cattle are very altitude sensitive and, Dr. Tamkun notes, big, easier to study, and a good model for humans. Cattle living in high altitudes are prone to right heart failure, more commonly known as brisket disease or high mountain disease. With this disease, the brisket becomes enlarged and spongy, and the animal dies of heart failure. Pulmonary hypertension, which is the cause of brisket disease, is probably due to blood vessel constriction in the lungs, which leads to increased blood pressure throughout the pulmonary system. This increased pressure overloads the heart and eventually leads to heart failure.

"What we are trying to understand is the connection between pulmonary hypertension and ion channels," Dr. Tamkun said. "We first study and understand normal cell function, and then move into understanding what goes wrong in animals susceptible to brisket disease. It's hard to fix a broken car if you don't know how it works."

Ion channels are pores in a cell's membranes that are made out of proteins. When the pore, or gate, opens, ions can flow out to establish a membrane potential. The pulmonary vascular potassium channels appear to be oxygen sensitive. When low oxygen is present, permeability decreases, the cell is depolarized, calcium ions flow in, and constriction occurs. Dr. Tamkun said some channel genes may have a defect, making the ion channel more sensitive to low oxygen, leading to increased constriction and brisket disease.

In the long term, Dr. Tamkun's research, which is funded primarily by the National Institutes of Health and also by the College Research Council, will give scientists a greater understanding of ion channels and how they affect vascular cell function. A more immediate benefit for the cattle industry could come more quickly. Currently, the risk of brisket disease, present in about 5 percent of the bovine population, is diagnosed through pulmonary artery pressure (PAP) testing. In this test, which is difficult, time-consuming, and sometimes inaccurate, pulmonary pressures are measured. If Dr. Tamkun's work can show the correlation between brisket disease and potassium ion channels, PAP testing may be replaced with a simple blood test. Dr. Tim Holt, a large-animal veterinarian in Gunnison, is a collaborator on the project and also provides Dr. Tamkun's lab with at-risk animals for testing in the College's large hypobaric chamber.

> "This work could have quite a positive impact on the cattle industry."

"We think this work could have quite a positive impact on the cattle industry," Dr. Tamkun said. "If you know you've got a bull at risk, you aren't going to buy him in Texas and move him to Colorado. You also can breed selectively to reduce the risk for high-country cattle if you know ahead of time what a particular cow's or bull's inherited susceptibility is."

Because, as Dr. Tamkun knows, while the Rocky Mountains are beautiful, they also can be deadly to cattle and even to people not physiologically up to the health challenges of a high-altitude, low-oxygen life. ■

Equine Research Program Running on a Fast Track

It used to be that a horse didn't have much of a leg to stand on if it was unfortunate enough to injure that leg. The old stereotype – leg broke, horse shot – was sad but often true. Today, thanks to groundbreaking research in equine orthopaedics, that scenario is increasingly rare. Veterinarians today can prevent, protect against, repair, and heal the majority of the injuries that at one time would have ended the productive life of an otherwise sound horse.

Leading the way in much of this research is the Equine Orthopaedic Research Program at Colorado State University. This multidisciplinary program addresses critical questions in equine musculoskeletal disease. For the past 17 years, most of the techniques for arthroscopic surgery to treat equine joint problems were developed at Colorado State. The program's researchers are responsible for identifying numerous new clinical conditions and producing most of the textbooks used in this subject area. And the work to prevent injury and save injured horses continues.

"We are very proud of what we have accomplished to enhance and improve the lives of all horses, whether athlete, show, or recreational," said Dr. Wayne McIlwraith, director of the Equine Sciences Program at Colorado State and a professor in the Department of Clinical Sciences. "We also know that considerable work remains to be done. Too many injuries and diseases still leave horses at risk for lifelong infirmity or euthanasia. Our research program is focusing on six primary areas of research we believe will have a profound effect on the orthopaedic health of all horses. By concentrating our efforts, our human and technical resources, and our funding dollars, we think we will make a difference where it counts."

The primary research focuses for the Equine Research Program follow.

1. Articular Cartilage Healing

Severe articular cartilage loss in osteoarthritis is the major cause for retirement of horses from athletic competition and ultimately affects all horses to some degree. Currently, program researchers are working on a subchondral "microfracture" technique developed by the well-known human orthopaedic surgeon, Dr. Richard Steadman. Researchers have completed a long-term study showing that the technique is superior to current treatments and are at work on a short-term study to evaluate the critical growth factors involved in articular cartilage healing and the times those growth factors are needed. The next step is to promote better cartilage healing using growth factors and Dr. Steadman's micropick technique.

2. Role of Microdamage to the Subchondral Bone in Traumatic Joint Disease

Severe injuries to joints, including catastrophic injuries requiring euthanasia, are a major problem for the racing industry. In pilot work, Drs. Chris Kawcak, Robert Norrdin, and McIlwraith showed that microcracks, as well as bone remodeling, occur early in the subchondral bone of horses exercised on a treadmill. Researchers want to identify when microdamage appears and develop a means of early detection. This would make it possible to modify the training of a horse and prevent more serious injury. Researchers want to eventually use serum markers to detect damage. This would provide a very sensitive detector that could forecast injury and allow for earlier prevention in the training process.

> "Too many injuries and diseases still leave horses at risk for lifelong infirmity or euthanasia."

3. Development of Synovial Fluid and Serum Markers to Detect Early Damage to Articular Cartilage and Subchondral Bone in Joint Disease

Equine program researchers headed by Dr. Clark Billingshurst are working to develop synovial fluid and serum markers that will allow sensitive detection of changes in cartilage and bone. This detection ability will allow researchers to evaluate new treatments for arthritis in clinical cases and enable the detection of microdamage in bone before it becomes a fracture.

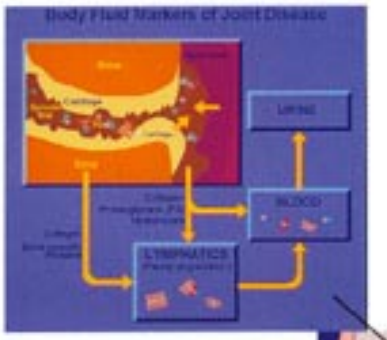
4. Intravenous Hyaluronic Acid and Its Mechanism of Action

In previous studies, researchers have shown that intravenous hyaluronan provides long-term, anti-inflammatory activity with traumatic joint disease. Researchers now are trying to understand how this drug works.

5. Gene Therapy

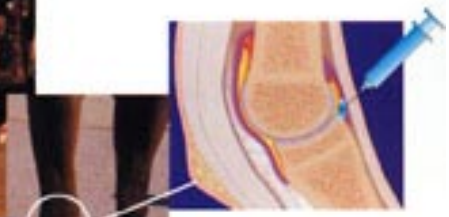
Researchers at Colorado State have cloned gene sequences and manufactured the proteins for equine interleukin-1 alpha and beta. They believe that interleukin-1 is the initial critical factor

KEY RESEARCH AREAS



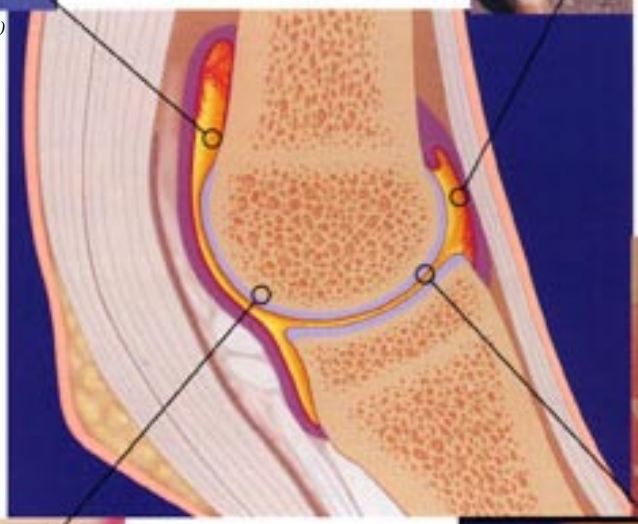
(Figure reprinted with permission)

Defining *synovial fluid* and *serum markers* associated with early joint damage.



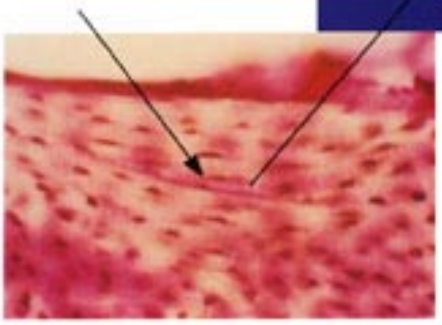
Developing *gene therapy* techniques to stop the early events of arthritis.

Developing methods to improve *articular cartilage healing* of the joint surface.



Evaluating the role of *microdamage* to the *subchondral bone* in fracture development and osteoarthritis.

Microcrack in *subchondral bone.*



in arthritis and are undertaking experiments to accurately define its role. In addition, they have cloned the gene sequence for the interleukin-1 receptor antagonist that would hopefully stop the activities of interleukin-1 before they started. Drs. David Frisbie, Gayle Trotter, and McIlwraith are developing the means to transfer this antagonist gene into the horse's joint and hopefully achieve continuous production of the inhibitor protein by the synovial cells.

6. Studies on the Effect of Conformation and Racetrack Surface

An ongoing study by Tina Anderson has developed objective methods of conformation measurement. In a separate project, conformation also is being measured in quarter horses to document the role of conformation on injury in this breed. In a third study, a computerized simulation model is helping researchers to understand the role of racetrack surface on performance and injury.

"We are excited about the scope of projects we have underway and the overall growth in our program," said Dr. McIlwraith. "We also are looking forward to completion of our new Orthopaedic Research Laboratory, which will allow us to expand our current efforts. People who love horses will be very pleased to learn what we are accomplishing." ■

Injury Control Center Working to Make Rural Living Safer

When Dr. Lorann Stallones makes her way through rural Colorado, she takes in the scenic vistas and picturesque farmhouses like most visitors. But there is something else she sees that most rural dwellers and urban day-trippers pass right over. She sees the unmarked railroad crossings, narrow winding roads, fast-flowing irrigation canals, kids piled in the back of pickup trucks, and many other seen and unseen hazards that dot the rural environment and set up a special set of dangerous circumstances.

Dr. Stallones is a faculty member in the Department of Environmental Health and director of the Colorado Injury Control Research Center (CICRC). CICRC began in 1995 with a grant from the Centers for Disease Control. The CDC had put out a request for applications to form two new regional centers (adding to the existing eight) that would provide training, research, and services related to the control of injuries. The Colorado State program chose to focus on underserved populations including rural and agricultural populations, Hispanics, Native Americans, and migrant workers.

"Most of the work in injury prevention has focused on urban populations," said Dr. Stallones. "The populations we serve have a very different set of circumstances and hazards in their environment that have not been adequately addressed."

CICRC began with a focus mainly on agricultural populations, but has expanded its scope to meet ever-changing needs. A major part of the initial work in developing viable injury protection and prevention programs involved bringing together people doing injury-related work and opening the lines of communication. Dr. Stallones and CICRC associates worked extensively within the Colorado State community to identify faculty members and research areas that might fall under the center's umbrella. As a result of that work, CICRC has linked part of its research to the University's Tri-Ethnic Center for Prevention Research, specifically with regard to violence, suicide, drug and alcohol abuse, and injury-related outcomes. For example, the CDC funded a project on violence and rural women, partially based on the strengths of the interdisciplinary programs at Colorado State. Dr. Ruth Edwards is the principal investigator on that project.

> "We hope to build our body of knowledge and implement research projects that will help reduce the incidence of injury and death in rural communities."

CICRC also is linked with the University of Colorado's Health Sciences Center in Denver and is looking at survivability in rural and urban auto crashes – a study useful for examining a statewide trauma system. A CU survey also is looking at behavioral risk factors that are injury-related such as helmet, seat belt, and child car safety seat use.

"There is so much work we can do, it's sometimes overwhelming," said Dr. Stallones. "But it's also very rewarding because we are having very real effects on the safety and well-being of so many people."

One example of that work is the playground at the Cache La Poudre Elementary School outside of Fort Collins. The playground was a classic model of playground danger with protruding hardware, hard surface areas, dangerous swings, and generally poor design. With successful fund raising, parental involvement, and financial and grant-writing assistance from

Through the Colorado Injury Control Research Center, Dr. Lorann Stallones and her colleagues are trying to make rural life safer. The irrigation canal shown here is just one of the many unique hazards rural residents face. Water in the canal can be slow-moving and innocuous or fast-flowing and dangerous.

The Colorado Injury Control Research Center helped Cache La Poudre Elementary School outside of Fort Collins build a safer playground.

CICRC, the school put in a new, safe playground last year. The children in the semi-rural community can now play on a playground that's not only fun, but safe too.

Other activities CICRC is involved with include development of an animal model for spinal cord injury and recovery with Dr. Doug Ishii, a professor in the Department of Physiology; a qualitative study on the rehabilitation of rural residents recovering from brain injury with Dr. Pat Sample, an associate professor in the Department of Occupational Therapy and CICRC's co-director of research; and communication projects with Drs. Michael Slater and Don Zimmerman in the Department of Journalism and Technical Communications.

"Over the next several years, we hope to build our body of knowledge and implement research projects that will help reduce the incidence of injury and death in rural communities," Dr. Stallones said. "We need to look at motor vehicle safety, water safety from the rural perspective – irrigation ditches and farm ponds, not swimming pools – emergency medical services, improving railroad crossings, and so much more. It's an exciting time to be in this field." ■

Microbiology Faculty and Student Achievements Honored

Kudos go to a number of microbiology students and a faculty member who recently marked special achievements in their academic and professional careers.

Dr. Donald Klein, a professor in the Department of Microbiology, was elected to fellowship in the American Academy of Microbiology. The academy is part of the American Society for Microbiology, which recognizes "excellence, originality, and creativity in all subspecialties of the microbiological sciences."

Ten microbiology students were elected to Phi Beta Kappa, the oldest and most prestigious of the scholastic honor societies. The students are Shane Baird, Laura Berg, Kathryn Billerbeck, Aaron Carnes, Alan Mayfield, Megan McGrew, Juan Rodriguez-Lay, Amy Satchell, Virginia Seigel, and Deborah Smith.

A number of microbiology students also were recognized at the Fourth Annual All-University Undergraduate Research and Creativity Symposium. Israel Muro won the All-Symposium Award for High Distinction with his research project "The Mapping of the Mycobacterium avium embA and embB Enzyme." Kerry Howell and Steven Kattman each won an award for excellence from the College of Veterinary Medicine and Biomedical Sciences. Also participating in the symposium were Lisa Gill, Ryan Gill, Kimberly Heid, and Evan Knaus. Three students who did research in the lab of Dr. Nancy DuTeau, though not microbiology majors, also received awards. Lorene Martinez and Kelly Keefe each won an award for effective communication of a project to the lay public. Lyric Beaty won the award for excellence from the College of Agricultural Sciences.

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"We believe that undergraduate research is an important part of our educational program in microbiology," said Dr. Carol Blair, department head. "We also believe students benefit greatly from working with faculty members who are good mentors. The performance of microbiology students at the recent symposium reflects that belief and shows how involving undergraduate students in meaningful research does make a difference." ■

Dedicated Volunteers Provide TLC to Hospitalized Foals

Driving by a green meadow in the spring, there's nothing more heartwarming than watching a new foal frolic with its mother in the open field. For most foals, a healthy, carefree life is a given. But for some, life's start is marred by health problems that require intensive care in a hospital setting. Each year, owners take many of these foals to Colorado State University's Veterinary Teaching Hospital, where young foals receive the care needed to survive.

"Primrose" the burro – a recent patient cared for by Foal Care program volunteers.

As with any baby, caring for a foal is a round-the-clock proposition – just ask any new parent up for the fifth time in a night to attend to a newborn's needs. Senior students on duty, clinicians, and hospital technicians attend to the medical demands of young large animals, but vital 24-hour nursing care is provided by a volunteer program at the VTH known as Foal Care. This program provides care for young foals and other large animals needing intensive support during their hospitalization.

"Through the Foal Care program, we are able to do a much better job of caring for the foals and other neonates," said Dr. Josie Traub-Dargatz, one of the program's faculty advisers. "Because of our student volunteers, our patients are getting the highest level of compassionate care possible, giving them the best chance at a positive health outcome and normal life."

Premature birth, infection, diarrhea, hypothermia, and neurologic problems are just some of the medical conditions that bring young large animals into intensive care. Foal Care volunteers help in the treatment of these animals by keeping oxygen and IV fluid lines attached; keeping the young animal clean and dry at all times; feeding the patient (often hourly) and milking the mother as often as needed; monitoring body temperature, heart rate, and respiratory rate and effort; making sure the young animal is properly positioned; and watching the young animal almost constantly.

As with any baby, caring for a foal is a round-the-clock proposition – just ask any new parent up for the fifth time in a night to attend to a newborn's needs.

"Monitoring these animals is very important because they have a tendency to pull out catheters, IVs, and tubes and take apart all the work that has been done to save their lives," said Dr. Traub-Dargatz. "The volunteers are essential in keeping watch 24 hours a day to make sure the neonates stay attached to lifesaving equipment and in attending to all their other needs."

Students who volunteer for the program are pre-vet and professional veterinary students. This year, 105 students attended the orientation for the program. Volunteers are trained and partnered with senior volunteers initially, to ensure they have the skills and confidence to attend to the neonates. Each year, two or three junior veterinary students act as coordinators of the program. These students coordinate all volunteer activities and schedule students to provide care to young, intensive-care animals. The program was initiated several years ago by Dr. Ann Wills, who graduated from the PVM program in 1997. Dr. Wills had a special interest in the care of foals and volunteered to coordinate the program. Since then, other students have volunteered as program coordinators, ensuring Foal Care's continuance. Other clinicians who help support the program are Drs. Kate Savage, Charlie Dickinson, Leslie East, Louise Southwood, and Melinda Edwards.

"The students who volunteer for the program put in many hours of service and provide care that would be prohibitively expensive for our clients if we had to charge for it," said Dr. Traub-Dargatz.

Volunteers check the condition and position of IV lines.

"The students get valuable experience, and clients get top-notch care for their animals. It's really a positive program for Colorado State." ■

Career with No Regrets? Not Possible, Says Former Dean

It was in the time of the Cold War that Dr. Rue Jensen, former dean of the College of Veterinary Medicine and Biomedical Sciences, faced a decision that could change his life. Relations between the Soviet Union and the United States were extremely tense, and U.S. intelligence and military agents were uncovering some disturbing facts.

Today, Dr. Jensen can talk openly about those times. As he faces the twilight years of his life, he seeks closure and personal acceptance for his decisions, some of which he openly regrets. The toughest decision he had to make was one he could tell to no one but his wife, Millie, because for many years a cloak of secrecy surrounded the area of biochemical warfare.

"At a point during the period 1975-1985," said Dr. Jensen. "Dr. William H. Feldman, a famous member of the Mayo Clinic Foundation, telephoned me in secrecy from Washington, D.C., and indicated that a powerful coalition of military personnel had determined that Russian authorities – despite treaty prohibitions – had conducted extensive research in biochemical warfare throughout World War II and continuing in the postwar period. The United States had conducted no such research. The coalition also stated that inequality by the United States and Russia was not tolerable and required early correction in research facilities and manpower."

Dean Jensen talks with his students.

The purpose of Dr. Feldman's call was to offer Dr. Jensen the position of research pathologist with a newly formed biochemical warfare research group. Dr. Feldman emphasized that the position was one of the most important in the nation with regard to national security. At that time, Dr. Jensen was nearing retirement but still actively involved in high-priority research projects such as hepatic telangietasis in cattle and both eosinophilic myositis and middle ear infection in cattle and sheep.

"When I first received the offer, I recognized that of all the positions in the national field ever offered to me, this one, on warfare, had the greatest magnitude," Dr. Jensen said. "Of course I would accept, I thought. But restraining factors in my life such as family sickness and research priorities worked to prevent my acceptance of the position."

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Dr. Jensen remembers well his wife's concerns about the outcomes of research in biochemical warfare. She knew of the incredible human toll caused by poison gases in World War I, and together they decided that Dr. Jensen should not participate in this type of research.

"The action was a good decision because it enabled continuance of three very high-priority research projects, but for me it was a wrong decision because biochemical warfare research was a subject of greatest importance," Dr. Jensen said.

Dr. Jensen joined Colorado State University in 1943 as an assistant professor in pathology. During his years at the University, he served as dean of the College and greatly expanded its research activities as well as strengthened its academic programs. He conducted important research in many critical areas of animal disease. He served as vice president of research and as director of the Agricultural Experiment Station. He fathered and nurtured many of the College's graduate programs. The research gains under his leadership helped to develop Colorado State as one of the top veterinary schools in the nation. Upon his retirement in 1976, he remained an active member of the University and Fort Collins community. When one examines the positive aspects of biochemical warfare – look no further than Iraq and the Kurdish people to see there are none – it's difficult to believe that Dr. Jensen made the wrong decision. ■

Dean Jensen during his early years at Colorado State.

Annual Spring Tradition Continues

It just wouldn't seem like spring without the annual tradition and celebration of the College of Veterinary Medicine and Biomedical Sciences' Scholarship and Award Night. This year's event was held April 23 at the University Park Holiday Inn and brought together students and donors to recognize scholarly excellence and thank those who make such academic accomplishments possible.

"This year, I was pleased to see that both the total number of scholarships and total dollar amount for scholarships have increased," said Dr. James Voss, dean of the College. "For this fiscal year, we distributed $619,523 among 257 scholarships. I want to thank each individual and organization who gave so generously to the College this year. I place a high priority on our student scholarship program, and it is very gratifying to see so many others who think it is important, too."

Donors established a number of new scholarships this year. New endowed scholarships are the James P. and Kate A. Hatfield "Blarney" Memorial Scholarship, Tuffy Huber Scholarship, Dr. Clark D. Vanderhoof Professional Veterinary Scholarship, and DVM Class of 1941 Scholarship. Pending endowed scholarships are the Mortimer/Beef Today/Elanco Scholarship, Jofrid L. Torgersen Memorial Scholarship, and DVM Class of 1998 Scholarship. New expendable scholarships this year include the Chapelle Small Animal Hospital Scholarship, Cheshire Cat Hospital Scholarship, and VIRBAC Dermatology Scholarship.

During the evening, Dr. Voss also recognized all who helped the College meet its commitment to create an endowment of $25,000 to support the Morgan Library's book and periodical needs. Each college at the University made this commitment, and the College of Veterinary Medicine and Biomedical Sciences was the first to reach its goal. ■

If you are interested in creating a scholarship, contributing to an existing scholarship, or have questions about scholarship donations, contact Paul Maffey, director of development for the College, at (970) 491-3932, or e-mail: pmaffey@cvmbs.colostate.edu

College Mourns Passing of Mrs. Thelma Deane, Compassionate Friend

From among her mother's possessions, Diana Westermann, daughter of Mrs. Thelma Deane, pulls out an envelope stuffed full of thank-you letters from the many veterinary students whom Mrs. Deane has helped over the years. The letters are a testament to the number of lives she touched through her kindness, generosity, and devotion. Mrs. Deane passed away on Aug. 23, 1998, at the age of 85. She leaves behind a legacy of caring for those in need.

"Giving to others has been the way of my Mom's life," said Diana. "As a young child, I remember my Mom always doing things for others. She was with the Red Cross for 50 years and with SCAVMA for many years as well. She just really cared about people, especially people dealing with difficult times."

Mrs. Deane became involved with the College of Veterinary Medicine and Biomedical Sciences through her husband, Dr. Harold Deane, a 1939 graduate of the Professional Veterinary Medical Program. Mrs. Deane, who also attended Colorado State University, was involved in many philanthropic organizations but was especially proud of the SCAVMA Emergency Loan Fund that she founded in 1971 and administered for 18 years.

Her daughter remembers how her mother entered a recipe contest from the Ortega food company and won a $500 grant for the University. Mrs. Deane decided to parlay the cash into a fund that allowed students to borrow interest-free when they needed money for emergencies. Last year alone, more than $20,000 in short-term loans was distributed to veterinary students. Emergency uses have included children's illnesses, deaths in families, delayed grants, car trouble, stolen bicycles, and much more. In 1984, Mrs. Deane was honored for her volunteer work when she received the Colorado State University Veterinary Special Service Award.

In addition to her work with the loan fund, Mrs. Deane was an active member

Thelma Deane

in a number of organizations including Collins Chapter 26 Order of Eastern Star, El Mejdel Daughters of the Nile in Denver, Tomah Club # 4, International Order of Rainbow #2, and several Masonic affiliated clubs. She served as officer and president of several of these organizations. She also belonged to the Poudre Valley Auxiliary.

When her charitable work was not

keeping her busy, Mrs. Deane found time to do craft work for others. Her ceramic mugs decorate many a desk at the College. In January, though she had been legally blind for seven years, she took up basket weaving and created many beautiful keepsakes for family and friends.

"Mrs. Deane was a cherished friend of our College, and she will be greatly missed," said Dr. James Voss, dean of the College. "Dr. Deane and his family are in our thoughts and prayers as they grieve the loss of this very special woman."

Mrs. Deane is survived by her husband, daughter Diana, son Robert, brother Vernon L. McHone, four grandchildren, and several nieces and nephews. Memorial contributions in tribute to Mrs. Deane may be made to the SCAVMA Emergency Loan Fund. Please send donations to Colorado State University, College of Veterinary Medicine and Biomedical Sciences, Office of Development, Fort Collins CO 80523. ■

Continuing Veterinary Medical Education — Fall 1998

Please call the Department of Clinical Sciences at Colorado State University at 1-800-457-9715 or (970) 491-8373 for further information on all course offerings. Courses are sponsored by the Department of Clinical Sciences and the Colorado Veterinary Medical Association.

For Equine Sciences Continuing Education Schedule, contact the Equine Sciences Program, Colorado State University, Fort Collins, CO 80523; (970) 491-8373. Web address: http://www.colostate.edu/depts/equine/continuing_ed/index.html

September 1998

September 30 - October 2, 1998 • Diagnosis and Treatment of Lameness in the Horse
Instructors: Dr. Ted Stashak, Dr. Wayne McIlwraith, Dr. Gayle Trotter, Dr. Richard Park, Dr. Gary Baxter, Dr. Dean Hendrickson
Cost: $500 non-CVMA member, $450 CVMA member

The course is designed to cover the various causes of lameness in the horse. It will cover each condition and its diagnosis in detail (including diagnostic nerve blocks and radiographic features). The treatment (medical and surgical) of each condition will be presented, and the various surgical procedures will be performed by the participants in the lab.

October 1998

October 15 - 16, 1998 • Current Techniques for Managing Corneal Ulcers, Corneal Lacerations, Pigmentary Keratitis, and Glaucoma (Small-Animal Program)
Instructor: Dr. Cynthia Powell
Cost: $375 non-CVMA member; $340 CVMA member

Background lecture material will be presented describing the medical and surgical aspects of ulcerative and pigmentary keratitis.

October 21 - 23, 1998 • Current Topics in Feline Medicine
Instructors: Dr. Dave Twedt and various Colorado State University faculty
Cost: $450 non-CVMA member; $405 CVMA member

This course will provide discussion in selected areas currently relevant to feline medicine. The intent will be to provide clinically useful, practical information in the following subject areas: endocrine and metabolic diseases, dermatology, cardiology, urology, oncology, reproduction, neurology, and infectious diseases.

October 29 - 30, 1998 • Everyday Problems in Small-Animal Neurology
Instructors: Dr. Mary Smith, Dr. Paul Cuddon
Cost: $550 non-CVMA member; $495 CVMA member

This is a case-based course covering the clinical approach to common neurological problems in small animals.

November 1998

November 13, 1998 • Cardiopulmonary/Cerebral Resuscitation and Advanced Emergency Techniques for the Practitioner (Small Animal Program)
Instructors: Dr. Tim Hackett, Dr. James Gaynor
Cost: $375 non-CVMA member; $340 CVMA member

The purpose of this course is to review common emergency procedures including cardiopulmonary resuscitation, thoracocentesis and tube thoracostomy, emergency tracheostomy, and wound management.

December 1998

December 2 - 4, 1998 • Management of the Acute Abdomen in the Horse
Instructors: Dr. Ted Stashak, Dr. Josie Traub-Dargatz, Dr. Gary Baxter, Dr. Dean Hendrickson, Dr. Ann Wagner
Cost: $600 non-CVMA member; $540 CVMA member

The clinical evaluation of the acute abdominal patient leading to a decision whether medical treatment or surgical intervention is required will be reviewed. Medical and surgical therapy will be discussed with specific emphasis on selection of drugs, preoperative patient preparation, anesthesia, intraoperative findings, postoperative care, and complication. Indications for the use of surgical stapling will be reviewed and the techniques illustrated. ■

INSIGHT

Estate Planning Courses

If you have possessions, you have an estate. The orderly care of these possessions during your lifetime represents financial management. The disposition of these possessions when you die is called estate settlement. Deciding their disposition in advance is known as estate planning.

Many people put off planning their estates because of a lack of time or understanding, and some simply don't wish to think about death. But estate planning is critical to your family's financial future, and the first step is to become informed. The Office of University Development at Colorado State is offering a home-study course to help you learn more about estate planning, wills, trusts, gift and estate taxes, and ways to increase income and cut taxes now.

The Creative Estate Planning course is composed of five different lessons, each consisting of four pages of easy-to-read information. One lesson is mailed to you each week for five consecutive weeks.

"Estate planning is critical to your family's future."

A multiple-choice quiz at the end of each lesson tests your knowledge of the information covered. A convenient file folder provided with the course enables you to store all the lessons for future reference. In addition to thorough instruction, you will also be offered a free copy of a handy book, *Your Personal Estate Planning Record*, upon completion of the course.

To request a copy of the Creative Estate Planning Course brochure or to enroll in the program, contact Paul Maffey, director of development for the College of Veterinary Medicine and Biomedical Sciences, at (970) 491-3932. ■

The Five Lessons Are:

- How You Can Shape the Future
- How to Make a Better Will
- How to Lower Estate and Gift Taxes
- How Trusts Can Improve Your Estate Plan
- How to Boost Income and Cut Taxes Now

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