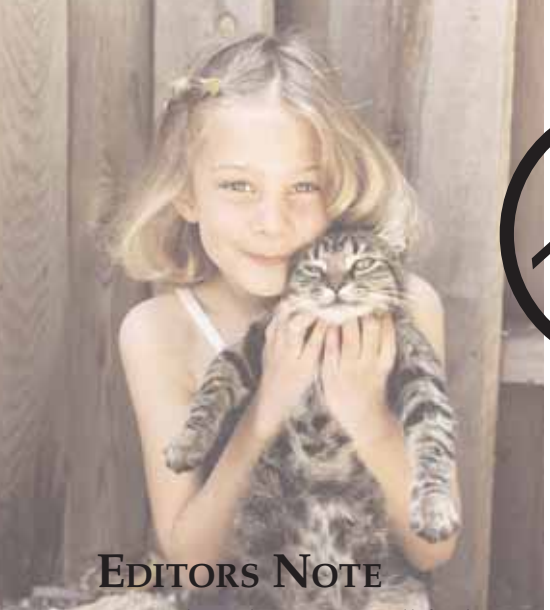

Animal Cancer Center NEWS
Colorado State University
Winter 2005-2006

Editors Note

In this edition you will find our regular features, including a "From the Bench" article by Dr. Doug Thamm describing the use of bacteria as an anticancer therapy. We also are pleased to announce the inaugural year of a unique graduate program in cancer biology. Another new feature in this issue is the "ACC Wish List." On this list are items large and small that we feel would enhance our ability to provide patient care, teach students, and continue our collective mission. In addition, the results of a study evaluating the use of complementary and alternative medicines that many of our clients participated in are featured on page 3.

As always, a thank you to everyone who continues to work and support the mission of the ACC: To improve prevention and treatment of cancer in animals and humans.

Inside this issue

"Great discoveries and improvements invariably involve the cooperation of many minds."
– Alexander Graham Bell

College of Veterinary Medicine and Biomedical Sciences
Colorado State University
Knowledge to Go Places

Cancer Biology Degree Program

Joe Sottnik appears to be a normal graduate student, with a ready smile and an open, friendly manner. Not too far into the conversation, though, when he begins to sprinkle the discussion with terms such as "immunotherapy" and "molecular signatures," the highly intelligent, thoughtful student of biology and medicine begins to emerge.

Joe Sottnik

Joe is a unique student in that he is pursuing a Ph.D. degree in a program that is the first of its kind at a veterinary school: the new Cancer Biology program. The Cancer Biology program is offered as a specialization within the highly successful Cell and Molecular Biology (CMB) Graduate Program in Colorado State University's College of Veterinary Medicine and Biomedical Sciences. The program's objective is to train scientists whose focus is the translation of basic science into the clinic in areas of cancer causation and prevention, diagnostics, therapeutics, and risk assessment. Emphasis is placed on training individuals who have veterinary medical degrees and want to obtain a Ph.D. in order to conduct research as a clinician/scientist.

The creation of the Cancer Biology specialization is a natural evolution of training in cancer research at Colorado State that has been on-going for more than 30 years. Because cancer research is multidisciplinary in nature, incorporating a broad spectrum of basic sciences and their application to clinical issues, the Cancer Biology program is designed to be interdisciplinary both in content and structure. The new program successfully taps the extensive expertise found at CSU, crossing both departmental and college boundaries to bring together more than 60 faculty members in four colleges who share an interest in cancer research.

Core coursework required of students includes a year of Biochemistry, Advanced Cell Biology, and Molecular Genetics, along with seminar classes where students, faculty, and visiting scientists participate. Additional courses specifically related to cancer biology include Fundamentals in Cancer Biology, Cancer Genetics, and Environmental Carcinogenesis. Students also are required to participate in the weekly Clinical Oncology Seminar, where each week a different topic concerning the clinical presentation, course, and treatment of malignancies is discussed.

During that first year, students are required to rotate through three

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Cancer Biology Degree Program *(continued from page 1)*

laboratories, the aim of which is to introduce students to a variety of research approaches, techniques and projects. Students accepted into the program are expected to complete their work and graduate within four to six years.

We recently spoke to Joe, who is also a cancer survivor, to find out more about his goals, his reasons for selecting such a rigorous program, and his expectations for the future.

You are a CSU graduate, are you also a native of Colorado?

I was born in New Jersey, but I grew up in Centennial, Colorado. I received my undergraduate degree in Biological Sciences, with a minor in Biomedical Sciences from Colorado State and followed up this spring with a Master's in Biomedical Sciences with an emphasis in neurobiology. And now, here I am working toward a Ph.D. in Cancer Biology.

When did you decide on a career in medicine and when did you become interested in the study of cancer?

Actually, I knew I wanted to be a doctor by the seventh grade. I have no idea what prompted it. When I was a sophomore in high school, I started taking additional classes at the local community college – subjects like anatomy and physiology – in order to get as much ahead of the curve as possible. I've actually been interested in oncology for awhile.

How did that come about?

Cancer has been in my life for a long time. During my sophomore year in high school, my aunt was diagnosed with breast cancer. Her doctors pursued an aggressive treatment, but she lost her battle later the same year. My high school art history teacher, ironically, was the co-director at Sky High Hope Camp which is a one week camp for kids with cancer. One year I asked if I could go to the camp as a counselor and I've been going every year since. That's where I met Dr. Withrow from the Animal Cancer Center and Dr. Kevin Lillehei, a neurosurgeon at the University of Colorado.

Did you decide to pursue a career in cancer biology and medicine based on this experience?

I'd like to specialize in pediatric oncology, based on my experience as a counselor at Sky High Hope Camp and my own experience as a cancer survivor. I was preliminarily diagnosed with lymphoma in the summer of 2001. I had some swelling and when chest x-rays were taken, a mass was discovered in the mediastinum, just above the heart. It was biopsied and at first found to be negative. They also found that I had kidney disease, which had to be treated first and that went on for almost two years. Then I began treatment for the cancer. I told my oncologist I wanted to pursue a very aggressive treatment. I had discussed this with Dr. Withrow who had told me about a case of his, a dog, who had a similar cancer. I underwent a heavy schedule of chemotherapy for six cycles – about five months. I wouldn't recommend it for everyone, but I felt it was the right choice for me. I've been in remission for a year now.

Joe Sottnik and Dr. Stephen Withrow outside the Animal Cancer Center. This photo was taken while Joe underwent chemotherapy.

How do you feel about being enrolled in the Cancer Biology program in the College of Veterinary Medicine, working around animal cancer patients rather than human cancer patients?

I have better learning opportunities here than I found at human hospitals – I've worked in human hospital labs and it was more of a "just sit back and watch" situation. Here, I'm getting more of a hands-on lab experience, and in a clinically applicable setting. I don't think the cure for cancer, or the next great discovery, is going to come from just one or the other. That's what the program is trying to instill, that interaction between the clinical and the classic lab science. Seeing both together, and understanding all the parameters, will help me do better research. There are some differences, between the animal and the human cancers, but there is also a lot of cross over. Animals go through the same physiological changes as their human cancer patient counterparts. So much in human medicine – across all specialties – has come directly from studies and cases in veterinary medicine.

So are you more interested in research rather than practice?

I'm a little torn between the two. I'm not interested in research for the sake of research, or for the sake of academia. I want to see that basic research applied to many different areas and moved along to more quickly be brought to the clinic.

What sort of things are you doing in the lab? Not just washing beakers, surely.

No, no. I wash beakers, too! We have a number of ongoing projects in the lab. For example, next week we're doing a bone allograft study

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ACC Study Finds that More Than Half of Clients Have Tried Complementary and Alternative Medicine (CAM) for Their Pets

Massage, acupuncture, botanicals, homeopathy, nutraceuticals. . . these therapies, often rooted in ancient practices and philosophies, have gained serious interest in human medicine in the past two decades. The enthusiasm for natural approaches in human medicine has generated a similar interest among pet owners and animal caretakers who are looking to apply the same natural therapies and alternative techniques in the care and treatment of their animals.

The veterinarians at the Animal Cancer Center are interested in learning more about the perception, understanding, and use of complementary and alternative medicine in veterinary cancer patients. What is the appeal of these therapies and where do most pet owners look to find information about the effects, risks, and consequences involved in the use of such therapies?

"We wanted to learn which therapies were most used, why they were selected, and where clients got their information about these therapies," explained Dr. Sue Lana, one of the ACC's medical oncologists who, with co-investigators, created a survey to help gather specific information about CAM use among veterinary cancer patients.

The survey revealed both some surprising and some expected results. An unexpected 97 percent of clients surveyed said they were interested in learning more about complementary and alternative medicine for their animals while more than half (65 percent) said they had already used some form of complementary or alternative treatment for their pet.

Although the intended purpose of complementary and alternative medicine use was varied, the most common reasons stated for seeking these therapies were to improve general well being (34 percent) and to improve immune function (22 percent).

The various modalities listed in the survey included supplements, prayer, diet, vitamins, massage, herbs/botanicals, Reiki/healing touch, flower essences, homeopathy, acupuncture, and chiropractic.

The most commonly used therapy was nutritional supplements, with 40 percent of respondents reporting their use.

Interestingly, the resources participants used to find information about these therapies varied, with almost half (46 percent) listing their veterinarian as a resource. When asked if their regular veterinarian supported the use of complementary and alternative therapies, 64 percent said they "believed" so, but only 35 percent said they had actually talked to their veterinarian about the use of complementary and alternative therapies.

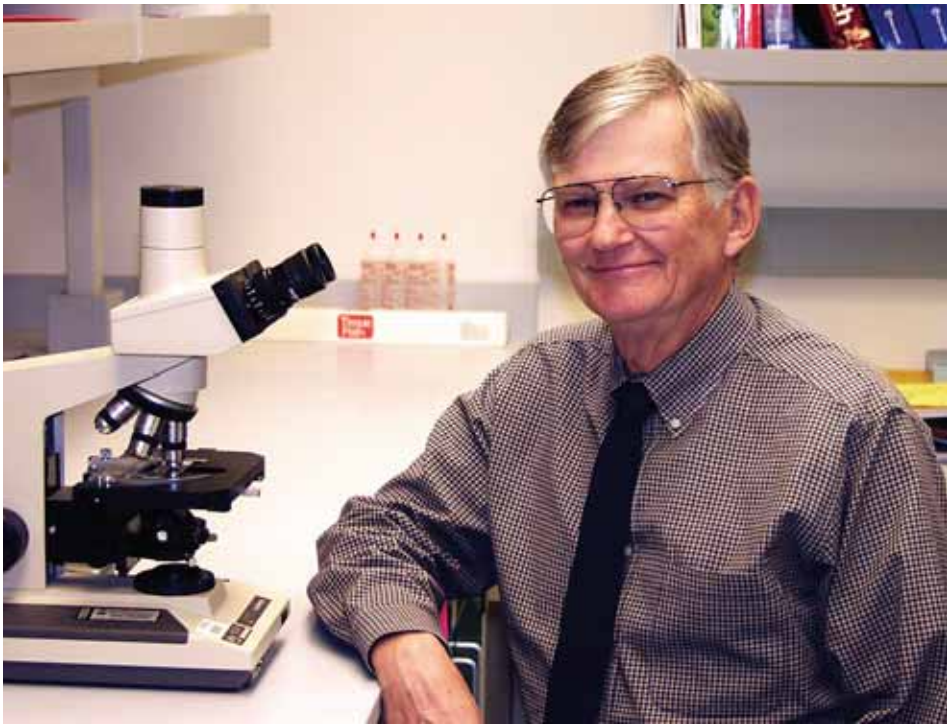
The study confirms what many veterinary medical professionals have come to believe, that more clients are willing to investigate a variety of natural health care strategies in the hopes of helping to restore the good health and vitality of their animals. Many clients will do so without the help, approval, or even knowledge of their veterinarian. Yet, this information could prove invaluable in cancer patients who are receiving traditional medications. Several reports have been published in the human literature regarding the potential for interactions between certain herbs and botanicals and standard chemotherapeutics. The same applies for animal patients.

"This brings to light the opportunity veterinarians have to appropriately educate pet owners concerning the possible pitfalls or benefits of these treatments," offered Dr. Lana. "In human medicine, reports have indicated that complementary and alternative medicine users do not often disclose this to their doctor, in some cases because they were not asked or the information was not noted in the medical record. Additionally, in veterinary medicine, clients need to be advised and educated regarding the misapplication of human complementary therapies to animals."

"These findings just underline the importance of good communication between clients and their veterinarians as some pet owners simply may not see these practices as medically important," Dr. Lana said.

With the enthusiasm for natural medicine on the rise, as this survey determined, there is urgency in veterinary medicine for scientific understanding of complementary and alternative medicine and developing a means of integrating appropriate therapies into regular treatment plans.

Founding Father of Veterinary Oncology Retires



Dr. Edward Gillette initially came to Colorado State University to study under Dr. William Carlson in what was then one of the first residency training programs in Veterinary Radiology. While Dr. Gillette became a diplomate of the American College of Veterinary Radiology (ACVR) and authored an early textbook in diagnostic radiology, his true interest was treating spontaneous tumors in pet animals. He worked with Dr. Carlson to establish radiation therapy at Colorado State University in 1959. This was a time when many people were reluctant to treat animals with cancer. He conducted radiation therapy with a systematic and scientific approach and overcame apprehension on the part of the animal owners and referring veterinarians.

Over time, the equipment changed from an orthovoltage to a cobalt unit to the first linear accelerator. That machine, commissioned in 1981 from funds procured by Dr. Gillette, was the first accelerator ever dedicated to the treatment of pet animal patients. Dr. Gillette was an advocate for the specialty of oncology, serving as President of the Veterinary Cancer Society. In 1988, he was recognized as a charter diplomate in the American College of Veterinary Internal Medicine, Specialty of Oncology. Likewise when the American College of Veterinary Radiology, Specialty of Radiation Oncology, was established in 1994, Dr. Gillette was one of only four charter diplomates. Interestingly, the other three charter diplomates received their Ph.D.s and their radiation oncology training under Dr. Gillette, so he was truly responsible for the beginnings and the development of radiation oncology. This type of impact on a specialty is extraordinary. There are now more than 50 veterinary radiation oncologists, and well over half can trace some aspect of their training to Dr. Gillette.

Dr. Gillette was one of the first people to recognize the value of using spontaneous tumors in animals as models for human cancer conditions. This was a strategy that benefited both veterinary medicine and cancer research in general. Dr. Gillette brought in over $20M in cancer research dollars and much of it was dedicated to the treatment of spontaneous tumors in pet animals. From this body of work, many of the fundamentals of veterinary oncology were established. Throughout his years at Colorado State University, Dr. Gillette was mentor for more than 24 Ph.D. students, many of whom became significant contributors to veterinary oncology.

Dr. Gillette has also served Colorado State University by providing leadership in a number of areas. He has been heavily involved with faculty governance and served on a number of important College and University-level committees. He served as chair of the Department of Radiological Health Sciences. In the later stages of his career, particularly through transitional retirement, he has focused on some goals he felt were quite important. He helped procure funding for the Animal Cancer Center, and was a tireless advocate for quality assurance during the design and building phase. His attention to detail helped make the ACC an ideal place for veterinary cancer research. Although his name may not appear on the grants, he has continued to help faculty members in the Animal Cancer Center obtain extramural funding.

There are few individuals on this planet who truly have had such a far reaching impact on the world of veterinary oncology. Dr. Ed Gillette is one of those individuals. Even after he cleans out his office and shuts off the lights, cancer patients (both human and veterinary) will continue to benefit from his work for years to come. To honor his dedication and years of service we would like to announce plans for acquisition of a new Linear Accelerator to be placed in the newly dedicated Dr. Edward L. Gillette Radiation Oncology Suite. Thank you Dr. Gillette!

Animal Cancer Center Wish List

Listed below are items both large and small that we feel would augment our ability to provide quality patient care, enhance our ability to teach future veterinarians, and continue our collective mission in the fight against cancer. If you are interested in donating funds toward the purchase of these items, please call us at (970) 297-4175.

Teaching microscope with digital camera
Function: To assist in teaching of veterinary students and residents in the art and science of diagnostic cytology. This would be used daily in clinical case rounds to discuss samples from cases seen each day.
Estimated cost- $20,000

Plasma wall screen
Function: To project digital images, presentations, and cytology images during case and teaching rounds. This would replace outdated slide projection presentations and add significantly to the teaching of students and residents.
Estimated cost- $2,300

Oncology Commons
Function: The restructuring and remodeling of the oncology service square footage such that procedures, group discussions, treatments, and examinations can all be performed in one larger commons area. This would ensure all teaching, treatment, and diagnostic procedures could be observed by the entire treatment team to ensure the highest level of teaching and patient care.
Estimated cost- $35,000 (including naming opportunity)

Other items:
Laptop Computer for conference presentations
Digital camera for general service use
Digital photo printer

Awards and Announcements

Members of the ACC attended the annual Veterinary Cancer Society meeting, held this year in Huntington Beach, Calif. Our members presented eight scientific papers and attended four days of informative sessions regarding the leading edge discoveries in veterinary cancer research.

June 2004 marked the 8th annual American Cancer Society's Relay for Life. The ACC participated by fielding two teams who raised over $2,300. Those who walked and camped out had a great time.

Congratulations to **Drs. Claudia Walter** and **Marie Mullins** for passing the American College of Veterinary Internal Medicine Oncology certifying exam and **Dr. Kim Hillers** for passing the qualifying exam in June 2005. **Dr. Philip Treuil** passed the American College of Veterinary Radiology-Radiation Oncology specialty examination. These individuals worked very hard to achieve their goals and we commend them for it. Great job, guys!

Dr. Doug Thamm received the Heska/E Gregory MacEwen Award for Outstanding Young Investigators presented at the annual Veterinary Cancer Society meeting in November 2004. This award is given to investigators in the first five years of their career who have made significant contributions toward the advancement of the field of veterinary oncology. Dr. Thamm also received funding from the American Kennel Club/Canine Health Foundation to study the effects of Silibinin, a compound found in milk thistle, on bladder cancer in dogs.

Also in November we were fortunate to have a visit from Dr. Andrew von Eschenbach, the Director of the National Cancer Institute. Dr. von Eschenbach presented his vision of the future of cancer research to a college-wide audience and toured the Animal Cancer Center facilities.

The ACC was recently awarded a $2 million Academic Enrichment Program grant. These monies will be used to further the growth of our program through new faculty positions and expansion of the radiation oncology facilities.

Dr. David Vail was an invited speaker at the International Society of Pediatric Oncology meeting in Vancouver as well the Children's Oncology Group in Los Angeles. Dr. Vail presented information on the importance of pet animal cancer as a model for similar cancers in children. Additionally, Dr. Vail has been awarded funding from the Morris Animal Foundation to study investigational therapy in canine soft tissue sarcoma. He also served on the scientific advisory board for the Morris Animal Foundation and currently serves on the ACVIM Foundation.

Dr. Nicole Ehrhart was awarded a grant to study the effects of gene therapy on bone allograft healing from the Musculoskeletal Transplant Foundation. She also serves on the Morris Animal Foundation Scientific Advisory Board.

Comings and Goings

Dr. Nick Bacon is welcomed to the ACC as the new surgical oncology fellow. He completed his surgical training at Cambridge University in England and is a native of Windsor, England. We are also pleased to have with us **Dr. Jim Farese,** who is on sabbatical from his current position as an assistant professor of surgery at the University of the Florida. We have two first-year medical oncology residents this year, **Drs. Kate Vickery** and **Anne Skope**. Dr. Vickery received her VMD from the University of Pennsylvania and completed an internship at Red Bank Veterinary Hospital in Tinton Falls, New Jersey. Dr. Skope also received her VMD from the University of Pennsylvania and completed internships at West Los Angles Veterinary Hospital and Angell Animal Medical Center in Boston. We are also joined by two new radiation oncology residents, **Drs. Travis Tuchak** and **Ron Carsten**. Dr. Carsten comes from a private practice in Colorado and Dr. Tuchak received his DVM from the University of Guelph and completed an internship at Wheatridge Animal Hospital near Denver. We look forward to the contributions they will make.

Those who have left the ACC include **Dr. Sarah Boston** who completed her surgical oncology fellowship and will provide surgical services at Massey University in New Zealand. **Dr. Philip Treuil** completed his two-year training program in radiation oncology and has accepted a position in a private practice in the Dallas, Texas, area. **Dr. Claudia Walter** finished her residency and is currently in private practice in Charlotte, North Carolina; in addition, **Dr. Marie Mullins** has taken a position in a private practice in Rochester, Michigan. We wish all of those who have trained and worked with us the best of luck in their future endeavors.

Finally, we would also like to announce the retirement of Dr. Ed Gillette (see story page 4). We have counted on his vision, integrity, guidance, and expertise for many years and will miss him greatly.

Dr. Lana and staff,

Thank you so much for the lovely book and thoughts that you sent us when Noralee passed away. I also enjoyed the picture of all of you and the luminaria that you lit for Noralee. We miss her so much.

We also miss seeing all of our friends at Colorado State University. We are so grateful for all of you and the chance we had to get to know you.

Love to all of you,
Lois and Ted

Dr. Ehrhart,

Thank you so much for everything you did for me. As you can see, I feel much better now! I go outside and lay in the sun and even play in my catnip! I will let you know how I am doing so you can help other pets like me.

Love,
Domino

Cancer Degree Program *(continued from page 2)*

to see if a certain protein can help increase bone healing in patients receiving radiation. The theory is that radiation stops bone growth and the problem for patients receiving radiation for osteosarcoma is that we need to increase bone growth to promote healing. This is a collaborative study with the University of Colorado at Denver Health Sciences Center.

So, would you say the experience and education you are receiving in the Cancer Biology program has been positive?

It is a fabulous program! I have so many opportunities to work collaboratively with the professionals here that it's hard to choose. These are people who check their egos at the door and work at a community level. I find that attitude of teamwork so encouraging.

I have the chance to meet with patients, watch procedures and talk with veterinary students and professionals. The Animal Cancer Center is just an amazing place. My experiences here have made me, and will continue to make me, a better student, a better person, and – I hope – a better doctor.

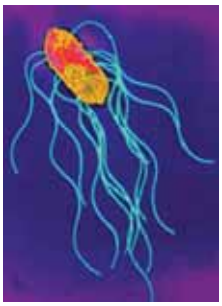
From The Bench

Tumor-Targeting Bacteria for Cancer Therapy

Bacteria were one of the first nonsurgical cancer therapies. In the late 1800s a New York surgeon named William Coley made the observation that some cancer patients on whom he was performing surgery experienced dramatic tumor regressions after developing an infection in their surgical wound. Coley was so impressed with these antitumor responses that he began purposefully infecting cancer patients with live bacteria ("Coley's Mixed Bacterial Vaccines") in order to hopefully treat these incurable cancers. With the advent of radiation therapy in the early 20th century and chemotherapy in the 1930s, this form of treatment fell out of favor. However, in the mid-1990s the concept of using bacteria for the treatment of cancer was revisited.

The mechanisms by which bacteria can kill tumors are poorly understood. Possibilities include directly injecting proteins into tumor cells that cause their death, stimulation of the immune system, depletion of essential nutrients, or other alterations in the tumor environment that make it hard for the tumor cells to live. Additionally, bacteria may be very effective at delivering genes into tumors for gene therapy. Genes coding for immune-stimulating hormones, factors that diminish tumor blood flow, and enzymes can all be expressed following bacterial infection. Finally, their sensitivity to antibiotics provides a simple mechanism for control should adverse effects occur.

We have been working with a genetically modified Salmonella bacterium that has been changed so that it is approximately 1,000 times less toxic than regular Salmonella and can only live in tumor tissues. It is not secreted in the urine, feces, or saliva and cannot live in the environment. It disappears from the bloodstream within 24 hours of administration but can be found in tumor tissue for up one month.



We recently completed a study treating dogs with cancer that had failed standard treatments with intravenous injections of this genetically modified Salmonella. Salmonella were detected in 42 percent of tumors from treated patients, and evidence of meaningful tumor shrinkage was seen in 15 percent of treated dogs. Many other dogs experienced minor tumor shrinkage, or an extended period of time without tumor growth. Overall, the treatment was very well tolerated. The most common side effect observed was short-term fever occurring after the injection.

We recently discovered one potential mechanism by which this Salmonella may be acting as an antitumor agent. We found that this Salmonella is able to very powerfully induce the death of tumor blood vessel (endothelial) cells when grown in tissue culture in the laboratory. This may result in the blood supply to the tumor being significantly diminished, leading to ultimate tumor death.

We will soon start a new trial using genetically modified Salmonella in dogs with cancer, funded by the Morris Animal Foundation. This trial will involve a single intravenous injection of a well-tolerated dose of Salmonella to dogs with soft-tissue sarcomas scheduled for surgery. Within 24 hours to two weeks after administration, the tumor will be removed and evaluated for bacterial colonization, tumor blood vessel cell death, and decrease in oxygen content. We hope to demonstrate endothelial cell death and subsequent decreased oxygenation and tumor cell death as a result of our treatment.

We want to thank you for everything you did for our Shanna. We know that she got not only extraordinary medical care, but also a great deal of affection and loving attention from everyone responsible for her care. We will always be grateful for the six months that we had with her when she beat the odds. We may have appreciated her even more than before because we knew that time was a gift. We thank you so much for that!

Thanks,
Katherine and Bruce

Colorado State University
Knowledge to Go Places

The Animal Cancer Center
James L. Voss Veterinary Teaching Hospital
Fort Collins, Colorado 80523-1620

www.csuanimalcancercenter.org

Honor Roll

Generous giving from the private sector to the Animal Cancer Center has become more and more important over the years. The following individuals (in alphabetical order) are especially noteworthy in that they have given once, or in a sustained way, more than $25,000 to support the efforts of the Animal Cancer Center. Our heartfelt appreciation goes out to them.

Barbara Cox Anthony
Major General John H. Bell
Maria Bristol
Don and Katy Callender
Charles Engelhard Foundation
Colorado State University Research Foundation
Dr. William and Sara DeHoff
Walter and Jaynn Emery
Gene and Marylynn Fischer
Robert H.* and Mary G. Flint*
Mari George
Golden Retriever Endowment Fund
Ed and Marilyn Hansen
Jeff and Renee Harbers
June Harper
Institute for Limb Preservation
William E. Johnson
Lawrence L. Jones, III*
Dr. Norman and Ann Jorgensen
Gretchen* and Taylor Joyner
Lillian M. Key
Robert and Eva Knight
Estate of Carol McCandless
Robert and Evelyn McKee Foundation
David Merin Foundation
Thelma C. Morici
National Institutes of Health
Gary L. and Alice M. Nordloh
Reiman Charitable Foundation
Cathy and Harold Roozen
Rotherham Family
Albert and Nancy Sarnoff
Patricia Shay*
Charles R.* and Lucia H. Shipley Foundation
Jacquelyn A Smith*
David and Peggy Sokol
E. Hadley Stuart Family
William V. Taylor
Ted and Lori Venners
Robert and Susan Wilson
Rosamond Zetterholm*

**Deceased*

– *Detach and Mail* –

Winter 2005/2006

❒ I want to assist financially in furthering the work of the Animal Cancer Center. Enclosed is my gift of $ _____. My check is made payable to *Colorado State University Foundation Animal Cancer Center.*

❒ My contribution is in memory of _____ (pet's name). (Please complete if your contribution is a memorial contribution.)

❒ My employer will match my contribution (and double my gift). Enclosed is the company's matching gift form.

I understand my gift is fully tax deductible as provided by law.

Name _____ Phone (_____) _____

Address _____ City, State, Zip _____

Although we appreciate any and all donations to the Animal Cancer Center, the cost of publication and mailing requires us to limit the mailing list to clients seen within the last year and referring veterinarians. A minimum donation of $100 is necessary to remain on the permanent mailing list. Please return this form with your gift to: **The Animal Cancer Center, Veterinary Teaching Hospital, Colorado State University, Fort Collins, Colorado 80523-1620.**

Thank You!

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