Radiation Therapy: IMRT Enhances Cancer Treatment for Companion Animals and Horses

Intensity-modulated radiation therapy (IMRT) allows the treatment of lesions in animals that we couldn’t previously treat, such as horses, birds and pocket pets,” says Alain Théon, professor of radiological science and chief of the school’s Oncology Service.

Dr. Théon, with his special interest in both equine and avian oncology, says some animals are too small to be treated with conventional radiation therapy without lethal collateral damage to normal tissues. IMRT enables accurate targeting of tumors with optimal radiation dosages while effectively sparing normal tissue.

Computer software is used to design three-dimensional treatment plans based on CT and MRI scans, and to position the beam of a high-power linear accelerator. Radiation is distributed exactly as needed, depending on both the shape and location of a tumor.

Frequent anesthesia is also a drawback in conventional radiation therapy, but IMRT drastically reduces the treatment schedule and the number of times an animal must be anesthetized, which increases the efficacy of treatment and the cure rate.

UC Davis is one of only a few veterinary schools in the nation with IMRT capability and the only school to have a comprehensive equine oncology program. Dr. Théon leads the program in collaboration with the Equine Medicine Service.

“The Center for Companion Animal Health (CCAH) cancer center, which opened in 2004, brings chemotherapy, radiation therapy and surgery all together for a comprehensive approach to evaluation and patient treatment for small animal and equine oncology patients.

It allows us to do more—both in providing clinical therapies, and observing and tracking the response to treatment,” says Dr. Théon. He is collecting data from ongoing clinical research in order to document tumor response of common skin, oral and intranasal cavity tumors.

Continued on page 2

Dr. Alain Théon treats an equine facial tumor using intensity-modulated radiation therapy (IMRT).

Also in this issue:

Laboratory evaluates exercise performance, page 3

Viewing snake eyes with ultrasound, page 3

Physical rehab therapy for animal patients, page 4
AVIAN INFLUENZA

TEAMWORK PROPELS RESEARCH AND PUBLIC HEALTH INFORMATION

Although the Asian bird flu has not reached California, Veterinary Extension Specialist Carol Cardona, who is studying avian influenza viruses in wild birds, says research on the flow of viruses between wild and domestic birds will provide insights about the disease and help us prepare for its inevitable arrival.

Dr. Cardona, who is a spokesperson for the National Center for Animal and Zoonotic Disease Defense, is one of several faculty members—from the Wildlife Health Center, California Animal Health and Food Safety Laboratory, the Veterinary Medical Teaching Hospital, Center for Animal Disease Modeling and Surveillance, and other school units—working proactively in an intense national effort to address the threat of avian influenza with diagnostics, education, research and technology. She says, “We are creating unique ties with the UC Medical Center faculty and a fresh model for teamwork in public health.”

Radiation Therapy

Continued from page 1

The radiation oncology facility with IMRT capability for both small animals and horses was supported by the CCAH and the Center for Equine Health. The new linear accelerator is enclosed in a large room with six-foot-thick concrete walls and ceiling, and the treatment area includes a specially designed equine recovery room.

Selection of the linear accelerator was based on the machine’s ability to deliver dual levels of ionizing radiation, which makes it possible to treat not only superficial lesions and those found in very small animals, but also deep-seated lesions in large animals or cancers involving significant amounts of bone.

Client CT and MRI scans are directly accessible by the computers used to plan IMRT treatments. Some soft tissue detail can only be seen in an MRI image, especially with brain tumors.

For greater accuracy, a laser positioning system is used with both the CT scanner and linear accelerator. The scans can be merged in order to calculate radiation dosages.

“While being able to offer IMRT to patients suffering from cancer is a big step, it is just the beginning in our effort to provide optimum cancer treatments for animals,” says Dr. Théon.

Nichole Anchell, staff research associate in Dr. Cardona’s laboratory, candles eggs to check embryo growth in both inoculated and control eggs for a study of avian influenza viruses.

Terra Kelly, DVM, prepares samples for virus isolation. Dr. Kelly, who is working toward a PhD in epidemiology, studies avian influenza in domestic and wild birds.

MASTER OF PUBLIC HEALTH

MPH DEGREE PROGRAM BECOMES ACCREDITED

The Master of Public Health (MPH) degree program at UC Davis received full accreditation in August 2005 from the Council on Education for Public Health.

The School of Veterinary Medicine, School of Medicine and the California Department of Health Services jointly run the program to train physicians, nurse practitioners, veterinarians and other health professionals.

MPH students learn to identify, prevent and solve community health problems, enforce laws, develop policies and respond to public health emergencies.

“There is a dire need for public health professionals in California and the nation, and this is going to become more acute in the near future,” says Stephen McCurdy, School of Medicine professor and MPH program director.

Since its inception in 2002, the MPH program has graduated 21 professionals who work in government agencies, health organizations, advocacy groups and businesses.

Currently, students with professional health degrees may enroll in the one-year course. Educators are developing a future program for students without professional health degrees.

For more information, visit the MPH Web site (http://mph.ucdavis.edu).
**Lab Evaluates Animals in Motion**

The Claire Giannini Hoffman Equine Athletic Performance Laboratory (EAPL) is dedicated to developing new tools and techniques for research and clinical applications.

The laboratory is directed by James H. Jones, professor of comparative respiratory and exercise physiology.

The new facility completed in May 2005 comprises a research laboratory, an equine exercise laboratory with a specialized research treadmill, and an equine exercise clinic with a treadmill for Veterinary Medical Teaching Hospital patient examinations.

“The treadmill allows an animal to be evaluated with the diagnostic equipment during exercise,” says Dr. Jones. Performance questions may involve orthopedic, cardiological, respiratory, muscle, airway disease or even pharmacological issues in the horse, and some problems may be difficult to observe at rest.

“While a horse is running on the treadmill, we can take direct measurements in the blood vessels and chest and study how the animal obtains or uses energy, or how diseases develop,” says Dr. Jones.

The EAPL is set up primarily for horses, but the treadmills, which can operate at racing speeds, can be slowed for small animals. The treadmills have built-in cutouts for force plates to measure the weight distribution on an animal’s feet while it is running. Video cameras at different angles allow investigators to construct 3-D images of animals in motion.

Dr. Jones has studied physiological questions pertaining to a diverse group of animals including emus, ostriches, capybaras, pronghorn antelope, and chimpanzees. When looking at questions of metabolism, respiration and cardiovascular function, he says, “What makes an animal ‘special’ is based in part on its size, and horses are big, highly selected athletes.”

The EAPL fosters a collaborative “task force” approach. Experts in biomechanics, bone, imaging and surgery may convene to evaluate a lame horse in the clinic.

“The school has a large faculty with a range of overlapping interests and expertise, and the school’s imaging capabilities are the envy of most other veterinary schools,” says Dr. Jones.

“What we can do with the facility is almost limitless,” he says. “We’re pushing the envelope in developing new clinical and research tools and understanding—and often, when you answer one question, you generate far more.”

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**ULTRASOUND EXAMS**

**OPHTHALMOLOGISTS STUDY SNAKE EYES**

Eye problems can be common in pet snakes. Veterinary ophthalmologist Steven Hollingsworth, ophthalmology resident Brad Holmberg, and avian and exotic medicine resident Anneliese Strunk conducted the first known high-frequency ultrasound studies of the eyes of 12 live snakes at the Veterinary Medical Teaching Hospital. A friend of the school lent the exotic pets to the effort last July.

The examinations produced the first detailed baseline information about the size, shape and anatomy of healthy snake eyes and structures such as the cornea, iris and spectacle (a protective membrane). Results of the study may help veterinarians provide better care for their exotic patients.
**Physical Rehabilitation Optimizes Recovery in Animal Patients**

V**eterinary physical rehabilitation—often indicated to maximize the functional potential of animals following injury, surgery or disability—is an expanding field.**

Both the AVMA and American Physical Therapy Association have adopted positions that support the collaboration of veterinarians and physical therapists to provide benefits to both patient and hospital.

“Physical therapy, an established field of licensed health care professionals who diagnose and manage movement dysfunction in people, has been important to human medicine for more than 80 years,” says Jackie Woelz, MS, PT, supervisor of the Physical Rehabilitation Service of the Veterinary Medical Teaching Hospital (VMTH).

“Through clinical findings and research, we are learning that many of the same principles and treatment techniques used for decades to reverse or minimize impairment in people may be extended to veterinary patients.”

The Physical Rehabilitation Service, opened in 2004 in the new Center for Companion Animal Health, works with neurology, orthopedics, medicine, oncology and ICU patients.

Rehabilitation can support a variety of goals, such as to alleviate pain; aid recovery from soft tissue injuries, joint injuries, orthopedic surgery or neurosurgery; correct gait abnormalities; or provide conditioning for geriatric animals.

Rehabilitation techniques include postural, gait and proprioceptive training, therapeutic exercise, hydrotherapy, custom orthotic fabrication, manual therapy and other modalities, such as cryotherapy and neuromuscular electrical stimulation.

“Although we utilize various therapeutic modalities and exercise equipment, we also use manual techniques for assessing and addressing soft tissue restrictions, range of motion, quality of muscle tone and strength in order to guide therapeutic exercise,” says Ms. Woelz. She and VMTH veterinarians communicate throughout evaluation and the course of therapy, and each case is actively reassessed according to patient progress.

The UC Davis service is the largest of the few physical rehabilitation facilities associated with a veterinary school.

“We see amazing and complicated cases here—particularly in neurology and orthopedics,” says Ms. Woelz. It’s a wonderful challenge, because you never know what is going to be presented, and every patient has a unique set of needs.”
Forget beach houses, mountain hikes and sailing. Summer offers a different sort of adventure for School of Veterinary Medicine students, who can opt to spend 10 weeks conducting research as part of the Students Training in Advanced Research (STAR) program.

National shortages of veterinary researchers loom in government agencies, biomedical institutes and veterinary schools. The STAR program encourages interest in research by introducing students to real-world projects and the laboratory environment. Associate Dean for Research and Graduate Education Programs and STAR program coordinator Kent Lloyd, says, “The STAR initiative offers an important strategy for recruitment of veterinarians considering the research path.” About 20 faculty mentors supervised 44 student scientists in 2005.

STAR students receive formal training in laboratory procedures, animal-rearing, molecular imaging and primate research. Students network with one another during seminars, a symposium and a fall poster session.

Promoters realize that many STAR students will ultimately land in a clinical setting. However, students and mentors agree that every participant gains from the experience. Veterinary student Scott Aoki, with two summers of research to his credit, says, “My experience has been nothing short of exciting. I have traveled the nation, experienced groundbreaking research, and met inspiring people who have made their mark on science. I plan on entering a PhD program in molecular biology. STAR has given me the confidence to take this next step.”

The following sponsors make the STAR program possible: Achievement Rewards for College Scientists Foundation (ARCS); Viki Krade Memorial Feline Research Fellowship; Center for Comparative Medicine, School of Veterinary Medicine; Merck-Merial Scholars in Animal Health Program; National Institutes of Health “T-35” Training Grants; Roy Grant Fellowship; and the UC Davis Mouse Biology Program.

### Developing Vaccines and Diagnostics

“Rift Valley fever is a zoonotic disease,” says Elizabeth Bukowski, “so doing research to develop a vaccine or a better diagnostic test may allow me to help more animals and people.”

Microbiologist Tilahun Yilma offered Bukowski a unique opportunity to accomplish some early steps in the development of a rapid diagnostic test for Rift Valley fever.

“RVF is exciting to work on because it’s on the list of potential agents of bioterrorism,” Bukowski explains. She says of research, “I like the ‘solving-the-mystery’ part—it will help me to be a better diagnostician.”

### Understanding Viruses

Eva Radke’s research interests led her to the Biosafety Level 3 laboratory of molecular biologist Thomas North.

She worked with the simian immunodeficiency virus (SIV) genome to shed light on HIV mutations and drug effectiveness. “Now I understand the process of transfecting cells and growing a virus in a cell culture,” she says.

Radke hopes one day to help answer a major question of science, “How do viruses evade drugs?” She also hopes to be able to model in animals how the viruses react in humans.

### A Study in Pain Management

Cats don’t react as other species do to certain medications, and the uncertainty makes some veterinarians reluctant to prescribe pain-killing opioids before or after surgery. New synthetic drugs, however, show promise for preventing suffering in feline surgical patients.

For his STAR project, Ryan Garcia worked with anesthesiologist Peter Pascoe, who helped him craft a study to compare the effectiveness of two synthetic opiates in calming cats and managing their pain after surgery.

“It was my first time to do research and design such a proposal. It was hard—and rewarding,” Garcia recalls. He observed cats before and after sedation and anesthesia, and assessed the cats’ responses to touching, handling, restraint, and light pressure. He also noted pupil size, sleepiness, posture and meowing, which indicated how the cats were responding.

“The study outcome may help a veterinarian decide what would be better for a patient,” Garcia explains. “I like the direct effect that clinical research can have.”
Gene Identification Leads to Screening Test for PKD in Cats

Cystic kidneys can sporadically occur in both cats and humans, but multiple cysts that develop early and on both kidneys are likely due to the hereditary form of polycystic kidney disease (PKD).

In a cat affected by PKD, cysts tend to become larger and more abundant with age, leading to eventual renal failure. The average age for cats to exhibit renal dysfunction due to the progression of cysts is 7 years.

The genetic mutation that causes PKD in Persian cats was identified in 2004 in the feline genetics laboratory of associate professor Leslie Lyons.

A search for the mutation among more than 800 normal and affected cats implicated PKD1, a gene already known to cause PKD in humans.

Success was due in large part to cat breeders and veterinarians who participated in PKD ultrasound screening clinics. Collaborators in the research included veterinary radiologists David Biller of Kansas State University, who first proved that PKD is inherited, and Eric Herrgesell of UC Davis.

PKD in cats is most common in Persians and other breeds that have Persians in their breeding. In the fancy cat breeds, of which Persians make up nearly 80 percent, it appears that just one copy of the gene is required to produce PKD, although the entire genetic make-up of the cat has influence on clinical signs and disease severity.

Clinical signs common to cats experiencing PKD or any type of renal dysfunction include depression, frequent drinking and urination, reduced appetite, and weight loss.

No cure is available for PKD. Clinical management is designed to prevent or minimize kidney failure and secondary conditions arising from poor kidney function.

The presence of cystic kidneys can be determined as early as 6 to 8 months of age. Diagnosis of PKD is generally certain by one to two years using ultrasonic techniques. Unfortunately, by the time cats with PKD have strong clinical presentations, they are old enough to have bred and already contributed PKD1 to the gene pool.

Generally, 50 percent of the offspring of an affected cat will inherit PKD. It is not yet known why some cats are more severely affected than others, or why mildly affected cats can produce severely affected cats and vice versa.

Now that the gene is identified, a test for the gene PKD1 is available for cats as young as 8-10 weeks of age—swabs are used by cat owners or veterinarians to collect DNA from the cat’s cheek and gums.

The Veterinary Genetics Laboratory (VGL)—a non-profit School of Veterinary Medicine laboratory for DNA parentage analysis, disease and diagnostic testing, and research—offers the test, which includes a DNA fingerprint for each cat along with test results. Genetic counseling is also available through the VGL to help with breeding decisions.

The test for PKD1 is highly accurate. It does not indicate how severely the animal will be affected by PKD, and a negative test for PKD doesn’t rule out other causes of renal failure. Cats exhibit a wide range of severity—many cats that test positive for PKD can lead normal and long lives.

Testing for PKD1 is currently recommended for British Shorthair, Persians, Exotics, Himalayans and Persian out-crosses. Breeders with positive cats are strongly encouraged to continue to interact closely with their veterinarians to evaluate disease severity and monitor renal function.

For more information about PKD testing, visit the Veterinary Genetics Laboratory Web site (http://www.vgl.ucdavis.edu).
Gifts for Education and Research

Estate Gift Sets

Scholarship Record

In October 2005, a $4.4 million contribution from the estate of Mrs. Theodora Peigh, combined with earlier support, created the largest scholarship endowment given by an individual to the UC Davis campus, a total of nearly $13 million. Mrs. Peigh was a lifelong animal lover devoted to her horses, dogs and cats. Her veterinarian, Dr. Jack Walther (DVM, UC Davis, ’63) says, “Mrs. Peigh’s gift fulfilled her life’s passion to ensure the care of animals by helping young people to become doctors of veterinary medicine.”

“I never had the good fortune to meet Mrs. Peigh, but I know she clearly had animals and the veterinarians who care for them in her heart,” says Bennie Osburn, dean of the school. “Our students will continue to benefit from her love for animals.” Since 1995, about 650 students have received support from the Peigh scholarships.

What will happen to my pet or horse when I die?

Animal owners and veterinarians can answer this question with confidence and compassion thanks to two new gift programs that guarantee “Tender Loving Care” for the entire life of a pet or horse. Through the two programs, TLC for Pets and TLC for Horses, the School of Veterinary Medicine will find permanent, loving homes for animals left behind when their owners die.

Selected members of the school’s veterinary community serve as caregivers. Owners establish funds at the School of Veterinary Medicine to ensure that the Veterinary Medical Teaching Hospital will provide lifetime veterinary care, including annual checkups, for their animals.

Individuals may initiate enrollment of a companion animal for $1,000 or a horse for $2,000. A veterinarian meets the client, assesses the animal’s health and behavior, and develops an individualized plan to ensure the most suitable home and caretaker.

To complete enrollment of their animals, clients make a bequest to the school through their estate plans.

A contribution of $30,000 for companion animals, $40,000 for horses or ponies 12 hands in height or less, or $60,000 for horses greater than 12 hands, assures lifetime care.

Donors in either program automatically become members of the Heritage Society for Animals.

“With TLC, people can plan ahead, as they do in other aspects of their lives, with the emphasis on providing for their beloved animals,” says Rick Timmins, director of the Center for Animals in Society and manager of the TLC for Pets program.

For more information about TLC for Pets, contact Dr. Richard Timmins, Center for Animals in Society, (530) 754-5251, rptimmins@ucdavis.edu

For more information about TLC for Horses, contact Dr. Gregory Ferraro, Center for Equine Health, (530) 752-6433, glferraro@ucdavis.edu.

Pets and Horses Who Outlive Owners Receive “Tender Loving Care”

Class of 1955 Reunites

The Class of 1955 celebrated 50 years as graduates of the School of Veterinary Medicine with a weekend reunion last September. Classmates received a warm welcome on campus—a private dinner, breakfast with Dean Osburn, a tour of new facilities and a reception to meet current veterinary students. Class members reflected on present and deceased classmates during the Rose Ceremony, a 50th reunion tradition.

William Wetmore of Turlock chaired the reunion committee and organized a class gift of $31,000 for the Veterinary Medicine Instructional Facility. A room in the new classroom building will be named in honor of the Class of 1955.

ENDOWMENT SUPPORTS NEW FACULTY RESEARCH

Mr. Gary Rogers of Orinda is pledging $1 million to the school as a memorial to his beloved late wife, Mary, to acknowledge her affection for animals, particularly cats.

The initial portion of Mr. Rogers’ gift created the Mary Rogers Endowment Fund to help new faculty members establish their laboratories, purchase equipment and initiate new research projects.

“With state budget fluctuations lending to uncertainty in research resources, the Mary Rogers Endowment Fund strengthens our efforts to help new faculty effectively launch their research programs,” says Dean Osburn.
Continuing Professional Education

2006 Programs for Veterinarians

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<tr>
<td>Practical Ultrasonography: Intermediate</td>
<td>May 20–21</td>
<td>UC Davis</td>
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<tr>
<td>3rd Annual Veterinary Neurology Symposium</td>
<td>Jul 22–23</td>
<td>UC Davis</td>
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<tr>
<td>Adventure Series—South Africa, 2006</td>
<td>Jul 29–Aug 12</td>
<td>South Africa</td>
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<tr>
<td>Practical Ultrasonography: Cardiology</td>
<td>Sep 16</td>
<td>UC Davis</td>
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<tr>
<td>19th Annual Fall Symposium on Recent Advances in Clinical Veterinary Medicine—including Feline Ultrasonography Course</td>
<td>Sep 17</td>
<td>UC Davis</td>
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<td>Equine Reproductive Techniques: A Short Course for Veterinarians</td>
<td>Sep 17–18</td>
<td>UC Davis</td>
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<td>Public Policy &amp; Animal Health Short Course: Politics, Facts, Beliefs</td>
<td>Sep 28–30</td>
<td>UC Davis</td>
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<tr>
<td>Practical Ultrasonography: Beginning/Review</td>
<td>Oct 7–8</td>
<td>UC Irvine</td>
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<tr>
<td>Practical Ultrasonography: Intermediate</td>
<td>Oct 21–22</td>
<td>UC Irvine</td>
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<tr>
<td>22nd Annual George H. Muller Veterinary Dermatology Seminar in Hawaii</td>
<td>Nov 1–8</td>
<td>Kauai, HI</td>
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<tr>
<td>8th Annual Veterinary Endocrinology &amp; Internal Medicine Seminar</td>
<td>Nov 28–Dec 5</td>
<td>Barbados, West Indies</td>
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2006 Programs for RVTs, Veterinary Technicians and Veterinary Assistants

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<tr>
<th>Event</th>
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<tr>
<td>Technician/Assistant: Surgical Assistance (I &amp; II)</td>
<td>Jun 4</td>
<td>UC Davis</td>
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<tr>
<td>Technician/Assistant: Diagnostic Parasitology</td>
<td>Jun 25</td>
<td>UC Davis</td>
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Nonsurgical embryo transfer has become the standard in the equine industry, and professor W.R. Allen’s laboratory has developed a technique that simplifies the technical demands and improves the success rate.

The course Equine Reproductive Techniques includes a session titled “Nonsurgical embryo transfer—application of the Wilsher forceps for improved transcervical embryo transfer in the mare.”

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Call toll-free: (866) 426-5693

For more information or to register for specific programs, visit www.vetmed.ucdavis.edu/ce.html.