

Arkeology

News and trends on veterinary medicine and the human-animal bond.



Teaching



Discovering



Healing

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A Legendary Snow Leopard's Leap of Faith

One of the world's rarest and most beautiful big cats comes to MU for a demanding surgical procedure that could help save the species.

In their native mountains of central Asia, snow leopards have been known to leap distances of 50 feet.

Not Pasha, an eight-year-old, male snow leopard at the Kansas City Zoo.

Both of Pasha's hips had degenerated due to a form of osteoarthritis called hip dysplasia. Untreated, the disease would eventually cripple and kill the cat.

Hip dysplasia is common in dogs and humans, and replacement of the defective hip is an increasingly common cure. However, the disease is so rare in cats that hip replacement surgery had been performed only once before on a snow leopard. Pasha was to be the second.



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FOCUS

The focus of this issue of Arkeology is the increasingly critical area of cancer in companion animals. Beginning on page four, Arkeology looks at how the College is building a world-class oncology center. A state-of-the-art infrastructure for healing and advanced research is in place, and the College is becoming nationally recognized for its contributions. Making the gains even more dramatic is the College's role in comparative oncology advances that hold high promise for conquering human as well as animal cancers.

PREVIEWS

The Next Big Step

At the MU College of Veterinary Medicine, success doesn't mean a time to rest. It's a time to build. And tremendous opportunities continue to present themselves.

Toward Leadership in a New Century

With help from its friends, the College is now laying a cornerstone that will give shape to its efforts for the next 50 years.

How To Build a World-Class Veterinary Oncology Program

The College's pioneering efforts in animal cancer research and treatment prove that top-notch professionals working in a state-of-the-art veterinary hospital can put breakthroughs on a fast track.

Getting Real Results in the War on Animal Cancers

For animal cancer patients brought to MU, the prognosis is changing from grim to promising for many tumor types. Here's a look at the actual ground that's being gained.

COMMENTARY: DR. JOE N. KORNEGAY

The Next Big Step

Celebrating the College of Veterinary Medicine's recent achievements should help us to achieve even more in the years ahead.

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Since my initial column for Arkeology, I have been named Dean of the University of Missouri College of Veterinary Medicine. This is a tremendous honor for me.

Many of you know my background. After graduating from Texas A&M in 1973, I spent three years in private practice before completing residency and graduate training at the University of Georgia. An 11-year stint as a faculty member at North Carolina State University followed. I came to Missouri six years ago as Chairman of the Department of Veterinary Medicine and Surgery and Director of the Veterinary Medical Teaching Hospital.

Times have certainly changed in those six years! In 1994, the College faced a funding crisis. Up to three million dollars was to be cut from what was then an eight million dollar state appropriation. Some saw this as the first step towards closure of the College.

A number of you helped rally support and the proposed budget cut was rescinded. Instead, new funding has allowed renovation of facilities. Six new professorships have been endowed. We enjoy strong support from key constituency groups, extending from animal owners to state legislators. This "miracle recovery" was recently celebrated in a full-page St. Louis Post-Dispatch article. The celebration is well deserved. We owe thanks to so many people who have stood by the College through thick and thin.

But where do we go from here? What is the next step?

I've sensed a gradual change in attitude at the College over the past six years. We've evolved from a bunker mentality borne of the proposed budget cut, to a sense of near euphoria over recent gains, to a more mature realization that much remains to be done. Recruitments of four endowed professorships and two department chairs are underway. A recent review of the curriculum provided a forum for the exchange of ideas, but no clear consensus on the need for change. Although new funding is potentially available through the university's mission enhancement program and our own 50th anniversary endowment campaign, a great deal of work will be required for this to become a reality.

Our students just keep getting better. At the same time, however, student debt continues to rise and now threatens the profession. We face the challenge of increasing scholarship and reaching out to key external constituency groups, while maintaining our commitment to teaching and service and ensuring that critical needs within the College are met.

So, in a way, the next step is to consolidate recent gains and continue to address the day-to-day challenges confronting all colleges of veterinary medicine. Is that all there is? In a word, no. The next step has to involve more.

Upon coming to Missouri, I was impressed by the general acceptance of the belief that the College could not be all things to all people. That we simply did not have the resources to offer the breadth of programs found at some other colleges. That resources must be focused to develop a few truly outstanding programs. This philosophy has been critical to our overall success and continues to guide resource allocation.

But this attitude has also led us to sometimes



News of the College's emergence as a world-class institution is beginning to spread. Major articles in the St. Louis Post-Dispatch and the Kansas City Star have recently drawn attention to the College's achievements in a variety of different areas.

think of ourselves as a small college with limited potential. It's now important that we think bigger and expand our dreams. That we aspire to be the finest college of veterinary medicine in the country. Not necessarily the biggest, but certainly the best! A college committed to teaching, healing, and discovering. And, importantly, a college that capitalizes on the natural synergy that exists among these three academic missions.

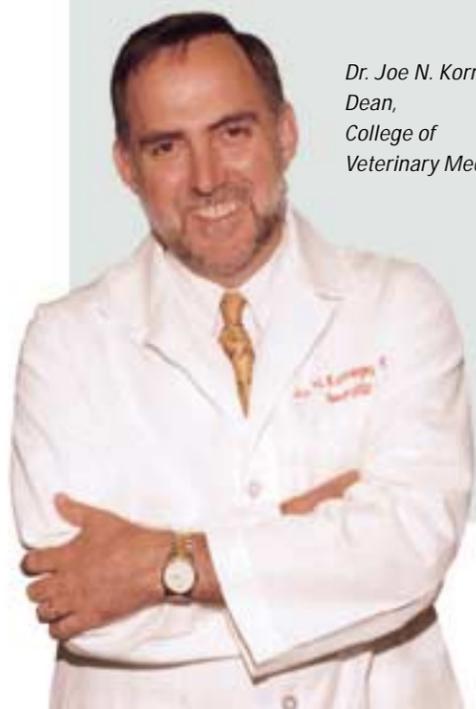
Actually, we're well on our way to being the best. The success of any organization depends principally on the quality of its people. This has always been true of MU's College of Veterinary Medicine.

Our staff, faculty, students, alumni, and key friends have sustained the College over the years. Now, with the endowed professor recruitments and the state's mission enhancement program, we have opportunities to add key faculty and staff who share our commitment to excellence. They will play a critical role as we move forward.

What will they find at MU? There are outstanding new facilities, including our teaching hospital, Clydesdale Hall, and newly-renovated classrooms and laboratories. But more than that, they'll find a true family that has learned the importance of sticking together.

A family that is now ready to take the next step.

—Dr. Joe N. Kornegay



Dr. Joe N. Kornegay
Dean,
College of
Veterinary Medicine



Toward Leadership in a New Century

The College's 50th Anniversary Endowment Campaign is not only its blueprint for the future, but an acknowledgment of friends, great and small.

Ten years ago, Thelma Zalk of St. Louis brought her black Labrador retriever, Lucy, to the College of Veterinary Medicine at the University of Missouri for hip replacement surgery. Mrs. Zalk expected competent care. She got a great deal more.

The faculty and staff were kind and helpful. Lucy was treated not just as another case, but as a new-found friend. Mrs. Zalk and Lucy felt that they were being welcomed into an extended family of true animal lovers.

Impressed with the skill, care, and attention given to Lucy, Mrs. Zalk determined that someday she would show her gratitude.

That day came this year with the announcement that Mrs. Zalk was giving the College \$300,000 to endow the Thelma P. Zalk Scholarship.

"It costs so much for students to attend veterinary medical school these days," she says. "We want people who really care for animals to be able to get the education they need to become veterinarians. I hope this will help some of them reach their goals."

"The generosity of this gift demonstrates the extraordinary depth of Mrs. Zalk's commitment both to animals and to student education," College Dean Joe Kornegay commented. "It doesn't get any better than that."

The Next 50 Years

The MU College of Veterinary Medicine opened its doors in 1946, and graduated its first class in 1950. Its growth came slowly, and sometimes painfully. At times the very existence of veterinary education in the state was at risk.

But over the years the College built a solid reputation for producing some of the nation's best prepared veterinarians for clinical practice. And in the past five years, with the opening of an outstanding new teaching hospital and the refurbishment of other facilities, the College has begun to be recognized as an emerging leader—and an institution that can attract world-class professionals in veterinary medicine.

To ensure that it could sustain this kind of achievement, the College announced its plan for funding the next chapter in its history—the 50th Anniversary Endowment Campaign. This



Mrs. Thelma Zalk with Lancelot, her Weimaraner and a frequent companion for outdoor romps, at their home in St. Louis.

The Campaign at a Glance

Total campaign commitments as of November 15, 1999 were \$8.1 million. New leadership gifts and pledges to the 50th Anniversary Endowment Campaign include:

- ▶ A \$750,000 gift from the **Research Animal Diagnostic and Investigative Laboratory** to establish the Joseph E. Wagner Fellowship in Laboratory Animal Medicine.
- ▶ **Estate of Colonel Charles and Charlene McKee**, Hereford, Arizona, \$570,000 to endow the Charles and Charlene McKee Professorship.
- ▶ **Kenneth and Barbara Levy**, St. Louis, endowment to support residency training in veterinary ophthalmology.
- ▶ **Thelma P. Zalk**, St. Louis, \$300,000 to endow the Thelma P. Zalk Scholarship for financially-needy students.
- ▶ **Theodore G. Short**, Springfield, Missouri, \$255,000 trust for students in need with high scholastic standing.
- ▶ **Andrew Love**, DVM '64, St. Louis, \$250,000 to endow programs directed by Associate Dean for Student and Alumni Affairs.
- ▶ **Dennis H. Miller**, Webster Groves, \$220,000 to establish an endowed scholarship fund in memory of daughter and son-in-law, Ann Miller-Roth, DVM '88 and Jerome E. Roth, DVM '74.
- ▶ **Richard G. Brooker**, St. Louis, \$100,000 pledge to endow scholarship in memory of "Needles" and in gratitude for the compassion and generosity of her veterinarians.

\$10-million effort will establish financial aid for students and underwrite facilities improvements and hospital programs. It will be the cornerstone of the College's journey into the 21st Century.

A \$10 million endowment effort is a daunting goal, however, and it helps to have friends. Campaign commitments now total \$8.1 million. All gifts and pledges received since July 1, 1996 are included in the campaign.

Four new professorships have been endowed: the Ralston Purina Professor of Small Animal Nutrition, the Tom and Betty Scott Professor of Veterinary Oncology, the E. Paige Laurie Professor of Equine Lameness, and the Charles and Charlene McKee Professorship in Microbial Pathogenesis.

"The giving opportunities at the MU College of Veterinary Medicine mean a chance to make a real and lasting difference; to empower the teachers, scientists, and healers we need for today and tomorrow," says David Horner, Jr., Director of Development for the College. "It's a solid investment to get behind the young people who will be the future protectors and keepers of the human-animal bond." **Ark**

How To Build a World-Class Veterinary Oncology Program

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The vision was an oncology center that could offer companion animals the same advanced cancer fighting techniques used in human medicine. The College of Veterinary Medicine has been building it, brick by brick, and now it's getting dramatic results.

Eva Rich of Jefferson City loves her mastiff Cu. Cu is named after Cu'Chulain, an ancient Celtic chieftain who drove mastiffs ahead of his army. Like his forebears, Cu is a born protector, with his massive size and a deep gruff "woof, woof" that he can summon to great effect.

In reality, however, the 150-pound Cu is a gentle giant. Kids climb all over him and he gently herds the family to bed at night, making sure they are safe before falling asleep himself.

On a hot July day last year, a swelling developed beneath the soft fawn-and-black fur on Cu's neck. Within two weeks, he had lost his appetite and was starting to lose weight.



Cu is a fearsome-looking mastiff with the heart and demeanor of a gentle giant. His prognosis was bleak until he came to the MU Veterinary Medical Teaching Hospital, Dr. Carolyn Henry, and the oncology team.

A Death Sentence for Cu?

The diagnosis from Cu's veterinarian was about as bleak as it could be: the mastiff had multicentric lymphoma which had spread throughout the lymph nodes in the neck, chest, and limbs. Later an ultrasonic examination would reveal that the deadly cancer had also invaded his liver and spleen.

The veterinarian told Mrs. Rich that Cu would be dead within a week without treatment. "Death was in his eyes," Mrs. Rich says.

But against all odds, Eva and her husband Skip wanted another option. That led them to MU's College of Veterinary Medicine and Dr. Carolyn Henry, Assistant Professor of Veterinary Medicine and a respected veterinary oncologist.

On a scale of one to five, with five indicating a broad-scale spread of cancer to organs and the bone marrow, Cu was a four. Still, 80 percent of dogs with this type of lymphoma respond to chemotherapy, and Dr. Henry advised the administration of an array of pharmaceuticals that would work in tandem.

A Lasting Reprieve

Cu was initially hospitalized for five days. Four types of drugs designed to kill the cancer cells flowed from an IV drip into his blood stream. At the end of the hospitalization, Cu had gone into partial remission. His appetite and good nature returned.

Cu went home and for the next six months made regular return visits as an outpatient carefully tended by Dr. Henry and her team. One year after his diagnosis, Cu visits the hospital once a month and remains in remission—even though he still has cancer.

For now, this will do for Mrs. Rich. "He's the only pet that I ever allowed in the house," she says.

The Birth of a Vision

About five years ago, coincidentally about the time of Cu's birth, a decision was made to develop a world-class veterinary medical oncology center at the College's Veterinary Medical Teaching Hospital.

At that time no such facility existed in the Midwest. The alternatives were to suffer with the disease, use the limited treatment options then available, travel to another part of the country for more sophisticated management, or have the animal euthanized.

Growing a center of excellence in veterinary oncology is not an overnight endeavor. In fact, as Dr. Cecil Moore, Interim Clinical Department Chair and Director of the Teaching Hospital puts it, it's like constructing a building, brick by brick.

Cancer therapy has been available at the MU Veterinary Medical Teaching Hospital for a number of years. But the vision of an oncology center with international standing was born out of a sequence of developments, some planned, some fortuitous. And one by one, the bricks have gone steadily into place.

Today, on the brink of the fifth anniversary of the decision to become a leader in oncology, the teaching hospital at MU is beginning to be recognized as one of the world's best. A place where animals have the best



Many cancers are addressed through a collaborative effort by veterinarians with differing specialties. Dr. Carolyn Henry (left), oncologist, regularly teams with Dr. Eric Pope (center), small animal surgeon, and Dr. Dudley McCaw, an expert in small animal medicine and photodynamic therapy.

chance of beating a devastating disease. Where the next generation of veterinarians will learn critical new skills. And a place where cutting-edge research provides new hope.

Such a center is important because many companion animals will develop cancer in their lifetimes. An advanced, centrally-located Missouri referral center is in a unique position to supplement routine chemotherapy and surgery with sophisticated radiation treatments, photodynamic therapy, and other advanced healing modalities.

An Infrastructure for Healing and Advanced Research

The foundation for the oncology program was laid in the 1980's when key faculty members such as Drs. Lou Corwin, Jimmy Lattimer, and Dudley McCaw began oncology work at the hospital. Then, in 1995, working with these and other faculty, Director of the MU Veterinary Medical Teaching Hospital (now Dean) Dr. Joe Kornegay and former Dean Dr. Richard Adams made a long-term strategic decision to establish one of the top clinical and research oncology facilities in the veterinary world.

For a college that had battled budget cuts and inadequate facilities for virtually all of its history, the plan looked extremely ambitious.

But a crucial cornerstone for the new center had been put in place in 1993 when Clydesdale Hall, the College's new teaching hospital, opened. The state-of-the-art facility was a \$21 million, 144,000-square-foot brick and mortar testament to the commitment of Missouri's animal owning public. At last, the College had the space and technology to devote to the treatment of major diseases, including cancer.

Another key component was the commitment of space in the hospital to accommodate a piece of equipment available at only a few veterinary hospitals—a linear accelerator. Designed to focus cancer-killing radiation on tumor cells while minimizing damage to healthy tissue, the accelerator was installed in 1997. A giant step, it represented a major technological investment and was a clear signal that the veterinary college was committed to developing a world-class program.

The accelerator works in tandem with a sophisticated computed tomography (CT) scanner. Installed only a few steps away from the accelerator, the scanner gave oncologists as well as surgeons and researchers sophisticated, precise, three-dimensional images of tumors and other medical disorders.

The oncology support team began to take shape, too. Dr. Lattimer, who had played a role in the College's oncology program for 15 years, earned his credentials as a radiation oncology specialist. Drs. Dudley

Getting Real Results in the War on Animal Cancers

As the reputation of the MU College of Veterinary Medicine oncology program has grown, so has the caseload. And so have the positive results. Some examples:

- ▶ In the past two years, the number of cancer patients at the Veterinary Medical Teaching Hospital has doubled, and may do so again by the year 2000.
- ▶ More than 160 patients have received radiation treatments in the last two years using the linear accelerator.
- ▶ Nearly 80% of the Hospital's lymphoma cases now go into remission. "Ten years ago," Dr. Henry notes, "many of these animals would have been euthanized because their owners knew little of the available treatment options."
- ▶ The outlook for dogs with osteosarcoma has improved with surgery and chemotherapy. One-year survival rates are now approaching 60 percent. In the past, animals with the disease were almost always immediately euthanized because there was so little hope.
- ▶ Many types of tumors that cannot be cured with surgery can now be successfully managed with radiation, photodynamic therapy, or chemotherapy. Other patients, like those suffering from feline leukemia, are also enjoying a better prognosis.
- ▶ Through clinical trials being conducted at the teaching hospital, oral melanomas in dogs are managed by using promising new tumor vaccines and gene therapy. This study is being done in association with the University's Ellis Fischel Cancer Center. If successful in dogs, the treatment may be modified for human use.
- ▶ Another joint clinical study will determine if a new radiopharmaceutical can stimulate an antibody response that will target carcinoma cells. The same University-wide team that developed the bone cancer radiopharmaceutical Quadramet is conducting this effort.
- ▶ Clinicians at the MU Veterinary Medical Teaching Hospital are investigating new treatment options for cats with vaccine-associated sarcoma. This tumor was first recognized in the early 1990's.

McCaw and Eric Pope continued their advanced research on photodynamic therapy, in which laser light is focused on tumors. The effort picked up speed with the arrival of Dr. Henry, a board-certified veterinary oncologist.

With the infrastructure and the technology in place, the caseload of Missouri animals suffering with cancer began to grow.

The Search for Leadership

The next step is just now taking form with the initiation of an international search for an endowed professor in veterinary oncology.

A Kansas City couple, Tom and Betty Scott, have endowed a professorship in oncology. The Scotts became associated with the College more than

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A World-Class Veterinary Oncology Center *continued from page 5*

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Peanut, a retired racing greyhound, dreams of his days on the track while Dr. Dudley McCaw, associate professor of veterinary medicine and surgery, prepares to administer the laser portion of photodynamic therapy.

30 years ago when they brought their family basset, Smiley, to the Veterinary Medical Teaching Hospital for treatment of a fractured vertebra. Tom Scott is now National Volunteer Chair for the College's 50th Anniversary Endowment Campaign.

An endowed professorship is one of the most prestigious acknowledgments a researcher, teacher, and clinician can achieve at a university.

It allows the professor to focus talent and financial resources to address major issues in a designated area. Often, groundbreaking discoveries are made under the leadership of endowed professors.

Photodynamic Therapy: A New Tool With New Promise

Another indication that the MU Veterinary Medical Teaching Hospital is emerging as one of the world's best is the addition of a therapy so new that it has been implemented by only a handful of human hospitals, and only one other veterinary hospital.

Photodynamic therapy is a two-part process. First, a compound that selectively localizes in tumor cells and is activated by a particular wavelength of light is administered to the patient. Then laser light of the relevant wavelength is used to destroy the tumor cells. Because the laser focuses mostly on cancer cells, little healthy tissue is affected. Side effects are dramatically reduced.

"Neither the compound nor laser alone does anything, but when you put them together, it can be an effective treatment for cancer," says Dr. Henry.

"Not only does this procedure help destroy cancer cells, it's also a one-time treatment as compared to multiple radiation treatments over three to four weeks."

To date, photodynamic therapy has been effective against many tumor types in dogs and cats.

The Comparative Medicine Concept

While helping animals survive cancer is the focus of the effort to build a distinguished international program, it is not the only goal. Human cancer patients will benefit too, under a concept known as *comparative oncology*.

In comparative oncology, clinicians and researchers from medicine, veterinary medicine, and other fields integrate their research on the causes and potential treatments for cancer. It's an approach that makes profound sense from several standpoints. Our companion animals today typically live in the same environment, eat some of the same foods, and are subject to the same toxins and stresses as their owners. Dogs in particular share a similar genetic structure and suffer from many of the same cancers as humans.

Working with dogs with cancer offers priceless insights into how similar tumors in humans might respond. Another plus of comparative oncology: because dogs and cats have shorter life spans, treating their cancers can provide greatly accelerated results for application to human patients.

The University of Missouri-Columbia is unique worldwide in having human and veterinary medical teaching hospitals, a nuclear research reactor, and other bioscience resources in the same location. Collaborative efforts among these groups have already borne fruit—including bringing important new radiopharmaceuticals to market.

Enhancing this effort at MU will be the Scott professor and another expert in tumor biology, now being sought by the College. Funded through the University of Missouri's mission enhancement program, this position will work with other experts in both human and animal biology at the University to develop additional special radiopharmaceutical agents to diagnose and treat cancer.

"Advances like these in comparative oncology epitomize the one-medicine concept, whereby advances in animal health also benefit humans," says Dr. Joe Kornegay, Dean of the College.

Increasingly recognized for its leadership in comparative medicine, the College sees oncology as an area where veterinarians can work with their colleagues from other disciplines to really make a difference. **Ark**



The College's successes with comparative oncology make it possible for veterinary medical advances to help cure cancer in humans. Dr. Clay Anderson, Assistant Professor of Hematology at MU's respected Ellis Fischel Cancer Center, and Dr. Carolyn Henry are working together on clinical trials involving both tumor vaccines and gene therapy for oral melanomas in dogs.



Only a few thousand snow leopards remain on the planet.

A Legendary Snow Leopard *continued from page 1*

A Species at Risk

There are only 200 snow leopards in captivity in the United States. In the wild, the species is truly endangered. Scientists estimate that only 6,000 are left on the planet. Their numbers have continued to decline even after being placed on the endangered species list. Poachers trap the animals for their beautiful coats, and human encroachment on their natural habitats has caused the roaming cats to fragment into small colonies, making them susceptible to inbreeding and the ravages of contagious diseases.

The 85-pound Pasha was born in captivity and came to Kansas City from the Little Rock Zoo. His hip condition was discovered in a routine radiograph during his quarantine.

Given the rarity of the cat, its importance in the species survival program, and the unique nature of the surgery, a search was made for a really outstanding veterinary orthopedic surgery team. That search ended with Dr. James Cook and his team at the College of Veterinary Medicine's Teaching Hospital at the University of Missouri.

With a successful hip replacement, the spotted predator could survive his disease, thrive, produce new litters of rare snow leopards, and live pain free for the rest of his life.

But the tawny cat had no knowledge of the surgical risks or the potential for miracle cures. For him, the experience would be an unwitting leap of faith.

Pain, Immobility—and Worse

Dr. Kirk Suedmeyer (Senior Staff Veterinarian for the Kansas City Zoo, MU DVM class of '87, and an adjunct assistant professor in veterinary medicine at the College) says Pasha's osteoarthritis was fairly advanced when it was first discovered, and already causing mobility problems. Pain, in fact, may explain why Pasha had not successfully bred with the zoo's other snow leopard, Fisher.

"This line is so valuable to the population," says Dr. Janis Joslin, Veterinary Advisor for the National Snow Leopard Species Survival Program. "If the arthritis gets too bad, the animal would have to be euthanized. This hip replacement procedure can extend his life. I think it is something we have an obligation to do."

Hip replacement surgery of this type normally costs approximately \$2,000. Fortunately, the procedure was funded by the SeaWorld and Busch Gardens entertainment divisions of the Anheuser-Busch Companies as part of their commitment to preserving wildlife.

A Surgeon's Commitment

Dr. James (Jimi) Cook is an MU-trained DVM, magna cum laude class of '94 with a Ph.D. in pathobiology. An assistant professor in small animal orthopedics and board-certified by the American College of Veterinary Surgeons, Dr. Cook has performed approximately 2,000 orthopedic surgeries and almost 200 hip replacements. As an intern, Dr. Cook assisted in the care of mountain lions and their cubs.

His background is particularly suited for Pasha's arthritis surgery. In addition to his surgery and teaching duties, Dr. Cook is the principal investigator on three research grants focused on arthritis. He and his team are creating a laboratory model of arthritic cartilage, for instance, to allow for quick and efficient testing of new therapies.

Another of Dr. Cook's research studies explores new ways to regrow damaged knee cartilage. This procedure surgically places bio-modified pig



Dr. Jimi Cook is a veteran of more than 200 hip replacement surgeries, but this was only the second in history to be performed on a snow leopard. Arthritis is a special research focus for Dr. Cook, who is leading a promising study on implanting biomodified tissue in canine joints to stimulate arthritis-damaged cartilage to regrow. The results could have profound implications for human medicine as well as for companion animals.

intestines against the damaged cartilage (called the meniscus) between the upper and lower knee bones. Normally, this cartilage cannot grow back because it has no natural blood supply. The implanted intestinal tissue stimulates the damaged meniscus to grow, and the introduced material is absorbed. The process has regenerated the meniscus completely in 80 percent of dogs studied thus far.

If later tests prove as successful, the procedure could someday ease the suffering of millions of people and animals with osteoarthritis.

Predator as Patient

Dr. Cook initially consulted with Dr. Suedmeyer in Kansas City. Radiographs were shared and discussed. The bone and muscle structure of the animal was reviewed. A decision was made to replace the right hip first, since it was the most damaged.

The veterinarians would use the same techniques and prostheses used in successful hip replacements for large dogs. Almost 98 percent of these operations are successful. Still, Dr. Cook noted, Pasha is an exotic predator and can't be given routine post-operative therapy.

"We can't control him like we can a dog," Cook said. "We can't put him on a leash and walk him."

In dogs, normal post-operative therapy includes "towel walking." Here, an assistant walks the animal, lifting a towel slung under the dog's belly. This allows the animal to exercise, without putting full weight on the healing bones. No one volunteered to towel walk Pasha.

Profile of an Insidious Disease

Hip dysplasia is a hereditary disease. Pasha's hips probably began to degenerate shortly after birth. If so, the ball at the top of each femur was never snugly seated in the hip socket. As the animal grew and became more active, stress caused small cracks in the bone. Further loosening of the ball and socket connection caused more cartilage and bone to degenerate. In advanced stages, the femoral ball can actually pop out of the hip socket entirely, crippling the animal.

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A Legendary Snow Leopard *continued from page 7*

And hip dysplasia is painful. Left untreated, the pain can become so overwhelming that the animal refuses to move or eat.

As Pasha's disease progressed, his body tried to compensate by creating new but unstable bone that grew haphazardly around the joint. This led to more inflammation of the surrounding joint capsule and cartilage. And more pain for Pasha.

A Cluster of Surgical Challenges

This condition is very similar to human osteoarthritis. And the snow leopard's surgery would closely resemble the procedures used to help people. One significant difference, Dr. Cook said, is the bones.

Snow leopard bones and muscles are very similar to those of domestic cats, although much larger. The bones of cats are generally straighter than those of dogs or humans. As leapers who must contend with hard landings, cats have extra thick cortical bone around their marrow.

Anesthesia is another special consideration. These high-altitude cats have unique blood oxygenation systems. Expert care is critical during sedation.

On the Operating Table

In beginning the surgery, to ease post-operative pain and speed healing, Dr. Cook chose an approach that went between the muscles rather than cutting into them.

The degree of hip damage was determined by pulling the femur away from the hip socket. Dr. Cook then sawed away the damaged top of the femur and hip, along with the extra bony growth.

Pasha's femur was much thicker and harder to saw than expected. The extra effort added a half-hour to the typical one-hour procedure.

Surgical cement was then applied to the hip area and the replacement socket cup was placed in position. It takes about 10 minutes for the cement to harden around the artificial hip implant. While the cement was drying,



Pasha's x-rays, before and after. In the larger image, the snow leopard's hip dysplasia is evidenced by the wide gap between the top of the right femur and the hip (on the left in the photo). Untreated, Pasha's pain might have become life threatening. The insert shows the new artificial hip joint snugly in place.

Dr. Cook drilled a hole into the top of the femur and implanted a stem with the replacement hip ball.

Art and Science

"Aligning the ball and socket is the art of this procedure," Dr. Cook said. "We place a long rod into the hip socket cup to measure its alignment. It has to be perfectly aligned. You have to do a number of these procedures to know what they are supposed to look like."

The ball and socket employed was a standard prosthesis, the same as used on a medium-to-large dog. Dr. Cook often performs hip replacements on dogs weighing up to 150 pounds.

With the socket cup cemented into place in the hip, and the ball and stem in the femur, the new hip was snapped together. A range-of-motion test revealed no problems. Stitches closed the wound and the patient was moved to the intensive care unit.

Waiting for Results

After careful initial observations, both Drs. Cook and Suedmeyer were pleased with Pasha's condition, and he was moved from the ICU to his transport cage. Three hours after the operation, Pasha was wide awake on the way home to Kansas City for recuperation. Within a few days, the cat was up and walking around his zoo enclosure.

But Pasha's hip replacement is only half done. He is already scheduled for replacement of his left hip at the MU Veterinary Medical Teaching Hospital. And Dr. Cook and his team are ready. **Ark**

Breaking News!

As Arkeology went to press, Pasha's second surgery replicated the original miracle right on schedule. With the big cat benefiting from healthy weight gains following the first surgery, Dr. Cook reviewed x-rays of the second hip replacement and pronounced the results "awesome."

Arkeology Because animals are more important today than ever before in our history, the MU College of Veterinary Medicine is dedicated to preserving, protecting, and strengthening the human-animal bond. *Arkeology*, as its name implies, is a medium for bridging between the role of the college as a protector of the animal kingdom (a kind of modern ark) and as a place where science, medicine, learning, and teaching can flourish (*logia* is the old Latin and Greek word for study or discipline). Continuously embarking on voyages of teaching, healing, and discovery, the College invites you on board this vessel to journey with us.



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