

Elbows, Hips and Orthopedic Surgery

The elbow is one of the most complex joints in the body—three bones have to fit together perfectly,” says Kurt Schulz, assistant professor of surgical and radiological sciences at UC Davis. “The hip joint is, alternatively, a relatively simple joint that has only two bones—but still they must glide perfectly as a ball and socket.”

Sometimes the bones *don't* fit or articulate well due to injury or disease, says Dr. Schulz, who is an expert in orthopedic surgery and the biomechanics of natural and prosthetic joints.

Cats have no common developmental orthopedic diseases, and rarely develop

joint infections. By far the most common problem for feline hips and elbows is accidental fracture.

In dogs, it's a different story.

Several breeds, including golden retriever, Labrador retriever, German shepherd, Newfoundland, Bernese mountain dog, rottweiler, border collie, and mixed breeds—both large and small—can develop hip and elbow “displasia.”

For instance, in the disease called FCP (fragmented coronoid process), a small portion of the bone in the elbow joint breaks off, which causes swelling,

arthritis, mild to severe pain, lameness and exercise intolerance.

Elbow diseases such as fragmentation or disunity in the joint create great difficulties for dogs, who carry more weight on their forelimbs than on their hind limbs.

Developmental hip problems can begin at any age, while almost all elbow diseases affect young dogs—signs begin to show up from about six months to two years of age. Osteoarthritis, the end result of joint diseases, can become apparent at any age.

Dr. Schulz and his colleagues carry out CCAH supported research to better understand the biomechanics and pathophysiology, or underlying causes, of developmental joint diseases.

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Agility dog resumes competition 14 months after corrective surgery for hip displasia—page 2.

Director's Message to the Friends of CCAH

Dear Friends:

Our fall update concentrates on two important disorders of dogs and cats.

Orthopedic abnormalities affect a significant proportion of purebred dogs, especially those of larger

The emphasis of canine orthopedic research is on understanding the abnormalities in joints and bone that predispose an animal to degenerative joint disease. If the actual predisposing conditions can be discovered, it may be possible to intervene at an early stage of life, before severe degenerative joint disease develops.

Dr. Kurt Schulz belongs to that new age of bright,

young veterinary surgeons who have been able to use newer research methodologies to help extend the life of our canine companions. The ultimate treatment for degenerative joint disease is an artificial joint.

UC Davis has been a world leader in hip joint replacement in dogs. Artificial elbows are on the horizon. However, Dr. Schulz is optimistic that early and less drastic surgical interventions may be the answer.

Just as joint replacement is the ultimate answer for failed joints in dogs, kidney transplantation has become the ultimate treatment for failed kidneys in cats. The research behind kidney transplants in cats was also pioneered at UC

Davis by another member of our surgery department, Dr. Clare Gregory. Two techniques that have been useful in preparing these cats for transplantation, hemodialysis and erythropoietin therapy of kidney-associated anemia, were also developed at UC Davis by Dr. Larry Cowgill.

I am very proud of the faculty of the CCAH and of the UC Davis School of Veterinary Medicine and their many contributions to feline and canine medicine and surgery. However, much remains to be discovered. What is the underlying cause of each orthopedic abnormality of dogs? Why do so many older cats develop chronic kidney disease?

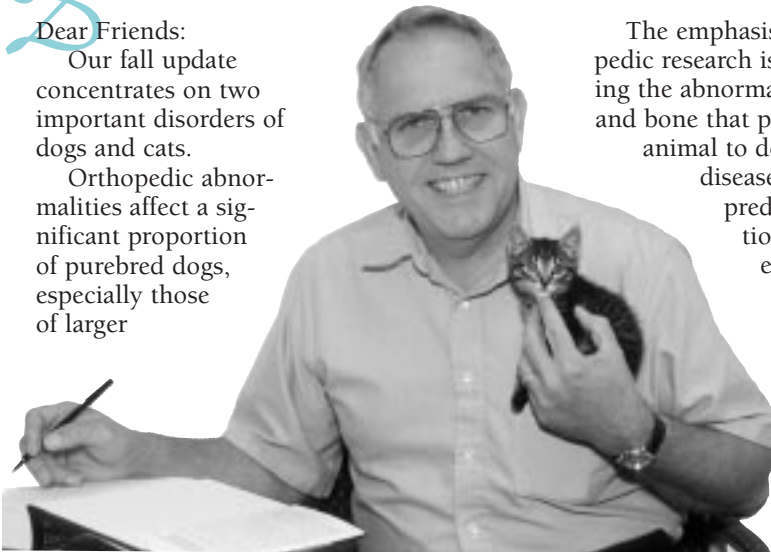
The CCAH will continue to raise funds to help answer these questions and to distribute money to those faculty and projects most deserving of support. More than 75 percent of financial support for companion animal health studies has come from pet lovers, and this will not change in the future.

The success that we have in obtaining support from owners of small companion animals is hopefully a measure of the quality and reputation of our clinical research. Thank you for your generous support over the years.

Yours sincerely,



Niels C. Pedersen, DVM, PhD
Director, CCAH



Dr. Pedersen, holding his newest companion, inscribes the *UC Davis Book of Dogs*.

breeds. The ultimate outcome of these various orthopedic abnormalities is a condition called "degenerative joint disease" or "osteoarthritis."

Degenerative joint disease is the major type of joint disease suffered by older humans, and like the situation in dogs, the age at onset and severity varies greatly with a number of heritable and environmental factors.

Chronic kidney disease of unknown cause is present in more than fifty percent of cats over 10 years of age. Destruction of the kidneys due to inherited polycystic kidney disease is common in some breeds of cats such as the Persian. Kidney failure, along with cancer, is the major killer of aged cats.

Cover Photo

Too Hip Snap wins 11th place in Jumpers at the July 1998 National Championship of the United States Dog Agility Association. In May 1997 he had corrective surgery performed by Dr. Kurt Schulz at UC Davis for hip dysplasia, which had made him temporarily unable to compete.



Kidney Transplantation Program Can Provide Quality of Life for Cats with Kidney Disease

Cats with advanced kidney disease have an opportunity to receive a kidney transplant, thanks to the program developed at UC Davis by Dr. Clare Gregory in 1987.

UC Davis is the only place in the world that offers animals a combination of both kidney dialysis and transplantation, allowing treatment of a wide variety of cases. Veterinarians trained in renal medicine at the UC Davis School of Veterinary Medicine now head kidney transplant programs at University of Pennsylvania, North Carolina and Cornell.

Dr. Gregory and his colleagues Andrew Kyles, Peter Walsh and a broad team of residents are approaching the 200th feline kidney transplant carried out at the Veterinary Medical Teaching Hospital.

Currently the program includes only cats, but thanks to CCAH funded research on immunosuppressant drugs, Dr. Gregory hopes to begin to offer clinical kidney transplantation to dogs by next spring.

“Dogs are extremely difficult to immunosuppress because of their genetic makeup,” says Dr. Gregory. “We have the technique and the ability to transplant canine kidneys, but currently the immunosuppressant drug that works would cost clients about \$4,000 per month. Our research aims to develop less costly methods to prevent kidney rejection in dogs.”



Ace (above) and his kidney donor, Crisco, share life as companion animal family members 10 years after Ace's kidney transplant.

The success rate of kidney transplant for cats is 70 to 80 percent (one in five may not live through the immediate postoperative period). Cats who survive the first year (overcoming immunosuppression problems, hidden infections or a higher incidence of cancer) may go on to live for many years—the current longest survivor is still doing well nine years after surgery.

Typically, renal transplantation is performed on cats who are losing weight or becoming anemic in spite of medical management of kidney disease. It is a treatment for renal failure, not a cure. The goal of kidney transplantation is to provide good quality of life for a cat who would otherwise be unable to survive, even though a “normal” life expectancy may not be achieved.

Transplantation is *never* performed on an emergency basis or as a “last ditch” effort. There is no age restric-

tion, but cats who are doing well with medical management (such as a low protein diet or subcutaneous fluids) are not considered candidates.

Renal transplantation can place a tremendous financial, emotional and physical burden on the owners of a patient. The animal must meet several health criteria, have a dedicated referring veterinarian and the family must agree to adopt the kidney donor cat and provide a life-long home. Kidney transplantation requires a commitment that cannot be underestimated, says Dr. Gregory.

In addition to investigative work on promising immunosuppressant drugs for both cats and dogs, Dr. Gregory and his colleagues are also working to improve the surgical technique of replacing an entire kidney and to eliminate some postoperative problems that can be associated with kidney transplantation.

Health Tip

In general,” says Dr. Danika Metallinos, resident veterinarian and CCAH researcher in genetics, “it helps your veterinarian figure out what’s wrong when your dog or cat is sick if you have a good idea of whether your animal has been eating, drinking and eliminating normally.”

She says, “Knowing what signs the animal shows, such as sneezing, coughing, vomiting or lethargy, can narrow down the number of diagnostic tests the veterinarian must perform to get an accurate diagnosis, which can save

both time and expense in prescribing appropriate treatment.”

Dr. Kyles says, “It’s important to diagnose kidney disease early on, when cats begin losing weight, drinking too much and urinating too much. Early detection improves the chances for effective medical and surgical therapy. By the time the animal is thin and vomiting from kidney failure, it may be too late.”

“If you and your veterinarian are aware that your animal is experiencing kidney failure and you are considering

kidney transplant, it is important that you investigate as soon as possible,” says Dr. Gregory.

“As we know the disease is terminal, it is best to pursue the transplant procedure earlier than later, before the stress of anesthesia and surgery would become too severe for an animal with kidney failure,” he says.

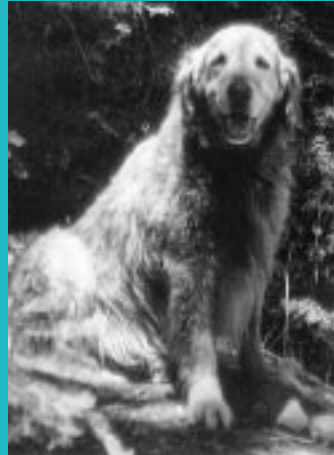
“Unfortunately, as the disease progresses, we must reject some patients who have lost too much weight, are too sick or have developed additional problems that make them unsuitable candidates for transplant.”

Our Friends and Companions



**Nancy Krakow and
Walthur's Boi-Oh-Boi (Junior)**
1986–1997
Napa, CA

*"The best friend we've ever had,
he showed us love and made
many new friends
for our family."*



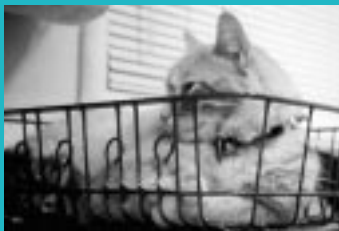
Nuclear (Nuke)
1983–1999
Reno, NV



Dusty Empire
1986–1999
Carmichael, CA



Golden Boy (sporting an elastic and
velcro safety ID collar lovingly made by
his human companion, Libbie Miller)
Auburn, CA



Michael
El Cerrito, CA



The Heritage Society

Charles and Georgia Decker of Cathedral City, California, are pictured with Dean Bennie Osburn at the unveiling of a recognition plaque containing the names of 152 charter members of the Heritage Society for Animals.

The Deckers and their fellow charter members (including Nancy Krakow pictured above with her cat, Junior) were honored at a luncheon in June where Dean Osburn thanked those who have named the UC Davis School of Veterinary Medicine as a beneficiary in wills, bequests or planned giving agreements. Planned and deferred gifts help to form a strong financial future for school programs such as the CCAH.

For more information on how to become a member of the Heritage Society, contact the Dean's Office—Development, (530) 752-7024, or visit the gift opportunities Web page (www.ucdavis.vetmed.edu/gifts).

Dear Dr. Niels Pedersen,
 My name is Alexandria
 Ambrose, and I'm in the third
 grade. You inspire me so much.
 My dad is a veterinarian. When I
 grow up, I really want to be a
 cat veterinarian. I really, really
 love cats. We are even doing a
 "Cats" play. I have three cats.
 Their names are Booca, Mushroom
 and Twinkie. My dad went to
 U.C. Davis to study veterinary
 medicine. Please send me two

autograph pictures signed please.
 If you could that would be
 great. I've been to U.C. Davis
 before. I think it is very cool. I
 have a big sister named Angelica.
 She is in the seventh grade.
 When she grows up, she is
 going to be a writer. Well, see
 you later!



Sincerely,
 Alexandria



Amp
 Patterson, CA

Dear Alexandria,
 I am enclosing two pictures of myself—my cat,
 Ernie, died a year after this picture was taken (he
 was 19 years old), but was quickly replaced by a
 sick little stray kitten named Yogi, who is now a
 big, healthy cat.

I really appreciated having a fan letter from
 someone so young and obviously dedicated to vet-
 erinary medicine. I hope that your dream comes
 true and that you will someday become a veterinar-
 ian in your father's footsteps. Your experiences with
 Booca, Mushroom and Twinkie have undoubtedly
 gotten you off to a good start. There is no better
 school in the world than UC Davis, and I hope to
 see you in our freshman class of 2011! This may
 seem like a long time in the future, but time really
 flies when you enjoy life and learning.

Study hard, but have fun along the way. You
 obviously have very good parents; listen to their
 advice as you make your way down this path that
 you have chosen. The veterinary profession always
 has room for more good cat doctors.

Yours sincerely,

Niels C. Pedersen, DVM, PhD
 Director, CCAH



Me, Chris (dog) and Ernie (cat)

Dear Alexandria, I have never been
 asked for an autographed picture in my
 life, and you made my day! Study hard
 and we will see you in vet school. Best
 wishes and good luck in your future
 endeavors. Niels C. Pedersen



Payday
 1991–1999
 Pacifica, CA



Dear Alexandria,
 I thought you would
 like this picture with
lots of cats. I hope
 that you will become
 the world's greatest
 cat doctor some day.
 Sincerely, Niels C.
 Pedersen

Elbows, Hips and Orthopedic Surgery

Continued from page 1

Some of their studies of elbows and hips include analysis of the surface contact of bones and load transmission when an animal walks. They also use technology such as quantitative computed tomography, otherwise known as “CAT scanning,” to devise methods for screening and to develop preventive measures.

Clinical Treatments

The Veterinary Medical Teaching Hospital has a very high caseload of dogs with elbow dysplasia. Dr. Schulz may see five or more cases a week.

Orthopedic treatments to relieve the condition include debridement—cleaning out the diseased tissue using a tiny power grinder such as those used in dentistry—and microfracture, a technique to cause cells in the diseased tissue to be replenished with healthy cells. Both of these surgical approaches require postoperative management

that includes intensive physical therapy and antiarthritic medications for about four weeks.

Total Hip Replacement

UC Davis has the largest program anywhere in the world for the study of total hip replacement (THR) in dogs.

THR is done for dogs with previous hip trauma, and most commonly, for dogs with hip dysplasia. A dog becomes a candidate for THR when medical management—control of body weight, appropriate exercise and treatment with pain medication—fails.

Dr. Schulz says, “We are working to optimize implant design and procedure to ensure that an artificial hip joint will function properly throughout a dog’s life. We are primarily interested in cemented total hip replacements that have been used successfully in humans for more than 20 years. We are also inves-

tigating the use of a joint designed in Switzerland that is ‘cementless.’ There are advantages to both cemented and cementless artificial joints; it’s important to have the option of either technique.”

Ninety-six percent of hip replacements in dogs are successful, but surgical complications can include dislocation of the joint (the ball pops out of the socket), infection (more a concern with cemented joints) and aseptic (not caused by infection) loosening, which can show up with either the cemented or non-cemented variety of artificial joints.

“In order to eliminate complications and give more dogs an opportunity for relief, we continue to research the most effective procedures in orthopedic surgery, and to share our findings with the veterinary profession,” says Dr. Schulz.



A radiograph (taken from below) shows Hakuna’s right hip implant, which appears as the solid, bright area. Note the perfect fit of the ball (implant) and socket (bone) joint.



The side view shows how the hip implant becomes an integral part of the leg bone (femur).

Dr. Kurt Schulz with Hakuna, a rottweiler, on her way home one day after surgery on both elbows to correct the condition called “fragmented coronoid process (FCP),” a form of elbow dysplasia. Dr. Schulz replaced Hakuna’s right hip four months ago.

In the Laboratory: Orthopedic Surgery

Techniques for orthopedic surgery allow dogs who suffer from disease or injury to continue to lead active lives.

The major focus in orthopedic surgery at UC Davis is joints—specifically the canine hip and elbow.

CCAH investigators work to ensure that the surgical techniques and the prosthetics themselves can give permanent relief to a dog with disease or injury to the hip or elbow.

Many artificial hip and elbow designs have been adapted from implants designed for humans. Before an implant or cement is ever used on a live canine patient, it has been mechanically tested in the laboratory using bones and computer modeling.

Elbow Displasia

The primary focus of research in elbow joint disease is to understand its pathophysiology. Theories about the causes of elbow disease include joint incongruity (where the shapes of the bones are not complementary) and metabolic deficiencies (that may cause weakness in the bones).

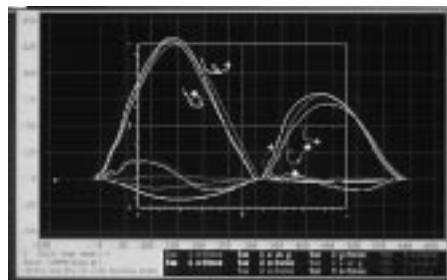
There are four conditions of elbow displasia that are being investigated:

- fragmented coronoid process (FCP)
- un-united anconeal process (UAP)
- osteochondrosis dessicans (OCD)
- osteoarthritis (OA)

FCP and OCD are diseases of the Golden retriever, Labrador retriever, Newfoundland, Bernese mountain dog and mixed breeds, including smaller dogs. UAP is almost exclusively a disease of the German shepherd. OA, the end result of the other diseases, can be a problem in any breed.

In order to understand more about pathophysiology, Dr. Chris Preston carries out biomechanical studies of joint surface contact (how the bones of the joint actually make contact when the animal walks), studies of joint load transmission and simulations of disease conditions.

Dr. Val Samii uses CAT scan (quantitative computed tomography) technology to determine bone density. She is working to develop methods for screening and preventive measures for displasia problems. Dr. Samii also does force plate analyses to study how joints work.



Force Plate Analysis at the J.D. Wheat Orthopedic Research Laboratory

Force plate analysis shows orthopedic experts how a joint performs while an animal is in motion.

A hip or elbow joint must allow the forelimb or hind limb to flex smoothly while bearing the animal's weight. As the dog walks across the force plate, sensors detect the forces exerted on each limb. An electronic graphical display gives an accurate analysis of the strength of each joint—just looking at the dog is highly inaccurate—and gives researchers insight on the efficacy of various orthopedic surgical techniques.



Orthopedic Surgery

Examination of a dog's elbow joint using fiber optics shows a bone fragment (at the tip of the needle) lodged in the joint. The dog has the type of elbow displasia known as FCP, which for some animals can be corrected with orthopedic surgery.

Total Hip Replacement

The following are some current CCAH projects:

- Investigate the effectiveness of hip implants that are cemented in place and implants that do not require cement
- Evaluate implant fit through computer-aided analysis of radiographs and the effect of surgical technique on implant fit
- Study the effects of implant design on load bearing qualities of cement used to anchor the implant in place
- Study the effects of surgical technique on cement durability—"We have one we think is best that has improved outcomes in humans, but it requires more equipment and more expertise," says Dr. Schulz.
- Dr. Schulz and his colleagues have instituted a national data base to compare and contrast the effectiveness of variations in surgical techniques—"It enables us to give recommendations on implant design and techniques based on the results of a large number of cases," he says.
- Ongoing projects include further study of cemented versus cementless hips and modifications of implant design.



Total Hip Replacement for Three-Legged Dogs

Sometimes a dog has lost a leg through previous injury, then develops painful disease in the remaining hip. Dr. Schulz and his colleagues have replaced successfully the remaining diseased hip of numerous three-legged dogs. Development of this very difficult procedure, published by the UC Davis veterinarians, was based on CCAH-funded research.

Special Thanks for Our Friends' Support

More than 1000 friends and clients contributed \$225,000 last year to support our CCAH research mission.

Although space limitations prevent listing every name, we want you to know that your financial assistance, whether \$10 or more than \$10,000, is very important and deeply appreciated.

The **Friends of Companion Animals** is a new association that recognizes donors who give \$1,000 or more annually to support CCAH research.

Several donors gave at this significant level in 1998-1999, and they are welcomed as charter members of the *Friends of Companion Animals*.

Charter membership opportunities will continue through June, 2000.

The *Friends of Companion Animals Honor Roll* expresses special gratitude to those who have so fully invested in our programs.

A brochure with more information about *Friends of Companion Animals* is available from the Dean's Office—Development; School of Veterinary Medicine; University of California; One Shields Avenue; Davis, CA 95616-8734; (530)752-7024.

Friends of Companion Animals Honor Roll

James S. & Judy A. Amao

Anonymous

Pearl Bell

Jim & Judy Caron

S.K. & Uma Chandrasekaran

Glen & Mary Ann Charles

Albert B. and Betty Y. Chu

Eve Coddon

Kathleen G. Correia

Coyote Hills Kennel Club

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(1409)

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