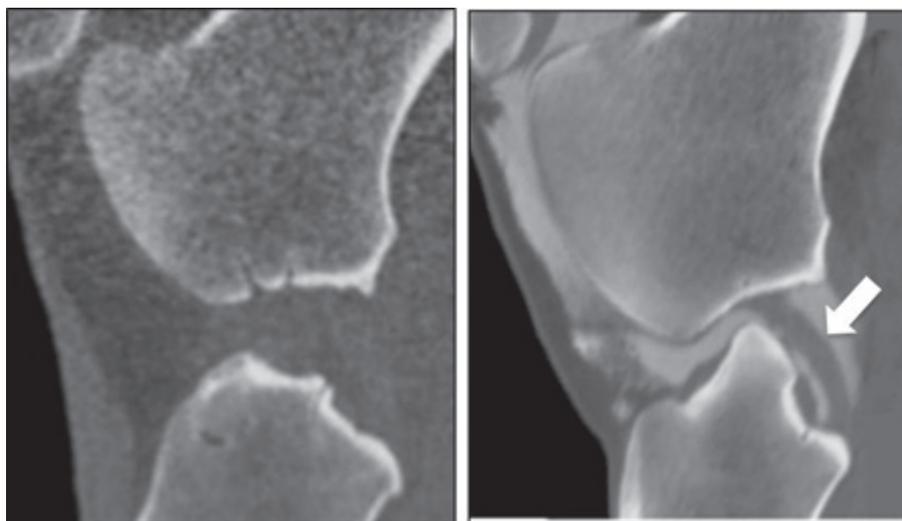


## WHAT'S INSIDE

Letter from Dr. McIlwraith.....	2
Comparing Treatments of Fetlock Deformities and Tendonitis .....	3
Repairing Articular Cartilage with Stem Cells .....	4
Malone Foundation Gives \$6 Million to Orthopaedic Research Center .....	5
Dr. McIlwraith Honored by Academy of Surgical Research ..	6
Dosing Trial in a Large-Animal Model, and Validation of Repeat Administration for Treatment of Osteoarthritis .....	7
Bioengineering Laboratories Become an Integral Part of the Orthopaedic Research Center ...	7
Standing Arthroscopy .....	8
Promotions .....	9
New Graduate Students and Staff .....	9
Awards .....	9
In Memoriam .....	10
Arthroscopic Surgery Courses at CSU in August 2013 .....	11
Advisory Board 2013.....	11
Research Sponsors 2013 .....	11

## Computed Tomography and Computed Tomographic Arthrography

### Diagnosing Femorotibial Joint Disease in Western Performance Horses



*Fig. 1: Parasagittal CT scans of the stifle: The left image is pre-contrast, and the right image is following injection of a contrast agent. Notice the outlining of intra-articular structures due to the improved contrast. In the right image, the caudal cruciate ligament is visible (white arrow).*

This study was done by Dr. Brad Nelson during his surgical residency, supervised by Drs. Chris Kawcak, Laurie Goodrich, Natasha Werpy, Alejandro Valdés-Martínez, and Wayne McIlwraith. The objectives of this study were to evaluate computed tomography and computed tomographic arthrography for the detection of femorotibial joint disease in Western performance horses.

The femorotibial joint is a common source of lameness in Western performance horses and is one of three joints that make up the stifle. Soft tissue injury is common, and

diagnosis of these injuries relies on ultrasonography and diagnostic arthroscopy because of an inability to do magnetic resonance imaging on this joint. CT is an advanced imaging modality that creates three-dimensional images.

When contrast agents are injected into the joint (Fig. 1), soft tissue structures within the joint can be evaluated. The study involved client-owned horses that had a hindlimb lameness localized to the stifle with intra-articular blocking with a local

## Letter from Dr. McIlwraith

Welcome to the 2013 edition of *Arthros*. Our newsletter highlights some important findings from the past year, including an NIH-funded study on bone marrow-derived stem cells implanted in cartilage defects with fibrin and PRP; preliminary testing of immune response to allogeneic stem cells; evaluation of chondroprogenitor cells from the superficial layer of articular cartilage and their effect on cartilage repair; and imaging of equine stifles using CT and contrast CT. Further details of our research for the last two years will be available in our 2012-2013 *Orthopaedic Research Center and Orthopaedic Bioengineering Research Laboratory Report*. If you would like a copy, please contact Katie Briggs at the ORC.



*Arthros* also details new developments in our faculty, staff, and facilities. We graduated our first equine sports medicine resident, Dr. Dora Ferris, and have just started with our fourth resident, Dr. Philippe Manchon. Drs. Melissa King and Valerie Moorman have both become members of our faculty as assistant professors after completing their Ph.D.s in our program. Also, the Orthopaedic Bioengineering Research Laboratory merged with the ORC and is now designated as The Bioengineering Laboratory within the ORC. OBRL leaders Drs. Tammy Donahue and Christian Puttlitz continue to do excellent work. Drs. Donahue and Ketul Popat recently gained a \$1.2 million research grant in conjunction with the Trinity College Centre for Bioengineering (Ireland) and Queens University (Northern Ireland) to address a growing problem related to knee injuries, specifically focusing on the soft-tissue-to-bone interface.

A particular highlight for 2013 was the acquisition of a \$6 million Endowed Presidential Chair from John and Leslie Malone. This is the biggest gift we have ever received, and it is really going to put our Equine Sports Medicine program on a solid footing. Thanks to our donors as well as research funding agencies, we've been able to continue with all our programs and research efforts. We will continue to justify your investment in what we do.

With best wishes for the holidays,

Wayne McIlwraith  
Director

## Computed Tomography

*continued from Page 1*

anesthetic agent. The American Quarter Horse Foundation provided funding to alleviate some of the imaging costs to clients.

Twenty-four horses were enrolled in the study, and all horses had radiographs, ultrasound, CT, CTR, and arthroscopic examinations of the stifle. Structures within each joint were evaluated and determined to be normal or to have a pathologic lesion. If a lesion was present, the severity of the lesion was graded. Each structure was compared with each modality to determine if the lesion was comparably detectable between modalities.

We found improved detection of bone lesions, including cystic lesions in the tibia and entheses (locations where ligaments attach to bone), compared to other imaging modalities. Lesions within the meniscus were detectable with CTR and were comparable to ultrasound, but the deeper areas of the joint (where meniscal lesions are difficult to detect with ultrasound) were better evaluated with CTR. Cranial meniscotibial ligaments (ligaments that attach the meniscus to the tibia) were better evaluated with CTR (12/14, 86 percent) than ultrasound (5/14, 36 percent).

Arthroscopy was the most sensitive method for evaluating articular cartilage and no other imaging modality accurately compared. The cruciate ligaments (analogous to ACL and PCL in humans) are a difficult structure to evaluate in horses. CTR was found to be a superior method for evaluating these ligaments.

The results of this study demonstrated that CT and CTR are valuable methods for evaluating stifle disease, especially when other diagnostic methods fail to detect a source of lameness.

## Comparing Treatments of Fetlock Deformities and Tendonitis

### Radiofrequency Probe versus Sharp Transection for Tenoscopic-Guided Desmotomy of the Accessory Ligament of the Superficial Digital Flexor Tendon

Desmotomy (or cutting) of the accessory ligament of the superficial digital flexor tendon (AL-SDFT), previously called the superior check ligament, has been used in the treatment of fetlock deformities and superficial digital flexor (SDF) tendonitis in horses. Studies using radiofrequency probes (RF) on articular cartilage have reported toxic effects; however, there are no studies critically evaluating this method for desmotomy. This study was done by surgical resident, Dr. Brad Nelson, together with Drs. Laurie Goodrich, Chris Kawcak, and E.J. Ehrhart (a veterinary pathologist who evaluated the tissues). They hypothesized that using an RF probe for AL-SDFT desmotomy would cause minimal damage to surrounding tissues, have a decreased operative time, and less intraoperative hemorrhage when compared to a desmotomy using sharp transection.

Six horses had an AL-SDFT desmotomy performed in both legs. The desmotomy method (RF probe versus sharp transection) was randomly assigned in each limb with each horse having both techniques performed. Desmotomy time, ease of ligament transection, and the amount of hemorrhage during surgery were recorded for each horse. Postoperatively, incisional site swelling, carpal sheath effusion (discharge), carpal goniometry (range of motion), and carpal sheath measurements were evaluated every three days for two weeks. AL-SDFT, as well as three other tendons (flexor carpi radialis (FCR tendon), radial

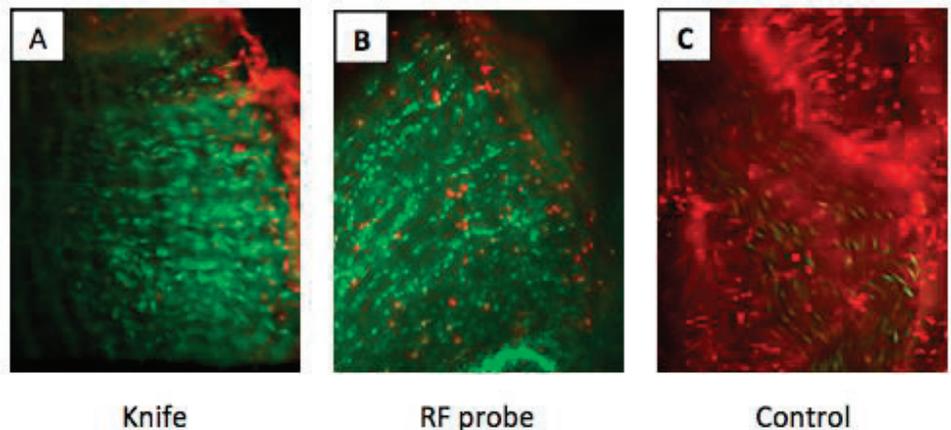
head of the deep digital flexor tendon, (RH-DDFT), and deep digital flexor tendon (DDFT) were collected from each limb of each horse for analysis. H&E and live/dead staining were performed on all tissues.

AL-SDFT desmotomy was complete in all cases. Mean  $\pm$  SEM desmotomy times were very similar between methods; 11.17  $\pm$  1.14 minutes

difference in any other parameter measured.

AL-SDFT desmotomy was performed easily with the RF probe, and we observed less hemorrhage with this method.

The increased inflammatory cell infiltrates in the RF group was likely due to the minimal heating caused by the RF probe, increasing



**Fig. 1:** Live/dead staining of the AL-SDFT following tenoscopic-guided desmotomy with tenotomy knife (A) and RF probe (B). The green stain represents living cells and the red stain represents dead cells. A control (C) was made by applying the RF probe with 15 seconds of constant application.

for the RF probe and 11.08  $\pm$  1.99 minutes for the knife. There was significantly less hemorrhaging associated with the RF group (40 percent) compared to the knife group (83.3 percent), and carpal sheath effusion was greater in the RF group at Day One and Day Four following surgery. Live/dead staining of the tendon samples revealed no differences between groups for any tissue, but there was a slight increase of inflammatory cell infiltrates in the RF group. There was no statistical

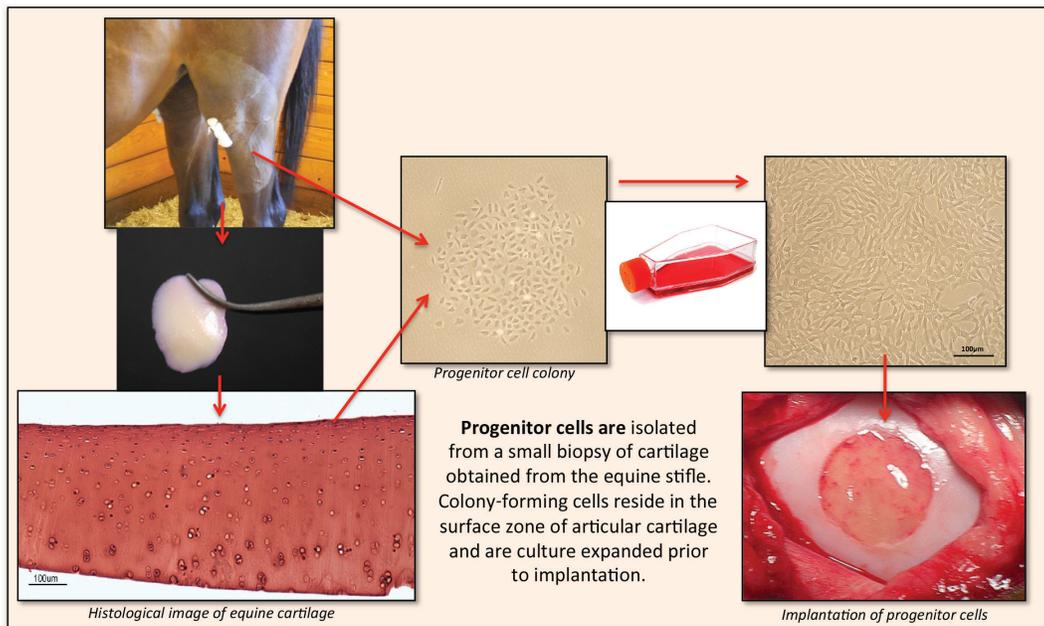
the temperature of incoming fluid. An important observation of this study, is that the RF probe did not cause significant changes in the tissue architecture or cell viability. Longer clinical studies will need to be performed to verify claims of long-term detrimental effects. Tenoscopic-guided desmotomy with the RF probe appears to be a safe alternative to sharp transection with a benefit of decreased intraoperative hemorrhage.

## Repairing Articular Cartilage with Stem Cells

Defects in articular cartilage are identified in greater than half the arthroscopy procedures carried out in the human knee, and similar numbers are seen in clinical cases of equine stifle (knee) arthroscopy. Despite a vast amount of research, it has been concluded that no technique to repair these defects has consistently yielded superior results, confirming that improved cartilage repair techniques are still necessary.

In our continuing quest for optimal cartilage repair, researchers at the Orthopaedic Research Center have teamed up with cartilage researchers Professor Charlie Archer and Dr. Helen McCarthy at Cardiff University to use specialized stem cells found in the top layer of articular cartilage (called articular cartilage progenitor cells) to repair cartilage defects in horses. These novel chondroprogenitor cells were based on a technique developed in Professor Archer's laboratory at Cardiff University.

The purpose of this equine study was to evaluate autologous (stem cells from the same horse going back into that horse) or allogeneic (off-the-shelf cells from another horse) ACPCs implanted in a



fibrin matrix to heal critical-sized defects using a 12-month equine model that included controlled strenuous exercise. We hypothesized that autologous ACPCs would provide improved cartilage repair compared to empty defects and provide a better healing than with normal stem cells from the bone marrow.

Defects that were treated with autologous cells had significantly improved repair tissue grade arthroscopically, as well as microscopically (cumulative histology score), compared to the control

defects. In some cases, defects treated with allogeneic cells did not show any significant benefit compared to fibrin or empty defects and radiographic changes were worse compared to autologous cells.

In conclusion, based on the arthroscopic and histologic scores, this technique was best with autologous cells and allogeneic cells would not be recommended at this time. Based on the results, combining autologous cells with subchondral bone microfracture (current technique for treating cartilage defects) could yield a clinically relevant advancement.



Sylvia Zerbini, featured performer during An Evening of Dancing Horses; photo courtesy of Grande Liberte Farm.

### Colorado State University

Join CSU and National Western for a Special Western Evening

## An Evening of DANCING HORSES

January 22 & 23 • 6:15 p.m.

A VIP experience at National Western Stock Show to benefit scholarships for future equine professionals and veterinarians

Contact Katie Briggs at [katie.briggs@colostate.edu](mailto:katie.briggs@colostate.edu) or (970) 297-4266 for more information. To purchase general admission tickets at CSU's group rate, go to [www.nationalwestern.com](http://www.nationalwestern.com) (enter code: NWSSCSU).

## Malone Foundation Gives \$6 Million to Orthopaedic Research Center

The Malone Family Foundation, led by media magnate and philanthropist John C. Malone, has donated \$6 million to Colorado State University's Orthopaedic Research Center to significantly advance the world-renowned center's scientific discovery and clinical expertise in equine sports medicine and rehabilitation.

The transformational gift will establish the Leslie A. Malone Presidential Chair in Equine Sports Medicine and will expand the Orthopaedic Research Center's pioneering Equine Sports Medicine and Rehabilitation Program by supporting an additional faculty member and resident. The faculty member to hold the chair has not yet been named.

"We are grateful for the Malone Family Foundation's substantial gift, and for the foresight of John and Leslie Malone, who understand the importance of supporting leading-edge teaching, research, and clinical service in equine sports medicine and rehabilitation," CSU President Tony Frank said. "This gift will help Colorado State to advance a new veterinary specialty that is critical to the health of equine athletes and the horse industry."

The donation represents an exciting marriage of interests: Leslie Malone, who runs Harmony Sporthorses in Kiowa, Colo., among other international horse operations, has been committed for nearly two decades to boosting the prestige of dressage in the United States through focused horse breeding and training programs. She has worked with multiple Olympians – both horses and riders – and raises Hanoverian, Oldenburg, and Dutch Warmblood sporthorses.

Aligned with Malone's interest, the CSU Orthopaedic Research Center is renowned for solving problems in equine musculoskeletal disease and injury, with development of new diagnostic imaging and surgical techniques, as well as cutting-edge gene and stem cell therapies.



*Dr. Chris Kawcak (left) and Dr. Wayne McIlwraith, director of the ORC, along with an equine patient on the ORC's treadmill.*

The center's faculty members, led by Dr. Wayne McIlwraith, have worked with competitive racehorses, cutting and reining horses, jumpers, and dressage horses.

As an outgrowth of its focus areas, the Orthopaedic Research Center in 2010 established the first and, so far, only residency program in equine sports medicine and rehabilitation in the United States.

The center not only trains future specialists, but is home to four charter diplomates and a fifth diplomate by examination in the American College of Veterinary Sports Medicine and Rehabilitation – representing unparalleled expertise in the newly recognized specialty. The American Veterinary Medical Association

accredited the ACVSMR in 2009 to certify specialists in the field.

The Malone Family Foundation gift, in supporting CSU expertise, will help establish the veterinary specialty by advancing work that keeps equine athletes at the top of their games, with emphasis on the structural, physiological, medical, and surgical needs of performance horses.

"Our work with talented equine athletes has shown us how crucial it is to understand the complete picture of sporthorse health, and to provide all the care they need when these animals are competing at the highest levels," said Leslie Malone, namesake of CSU's Presidential Chair in Equine Sports Medicine. "I hope this gift to CSU will elevate a veterinary specialty that is central to the competitive abilities of equine athletes."

Dr. McIlwraith, founding director of the Orthopaedic

Research Center and a decorated equine surgeon and orthopaedic researcher, said the Malone gift will help CSU set a gold standard for teaching, research, and clinical service in equine sports medicine and rehabilitation, a specialty that is sure to grow as owners continually raise their expectations for sporthorse care.

"We truly appreciate the Malones' gift because our *raison d'être* is making things better for the horse," said Dr. McIlwraith, a University Distinguished Professor. "Within our center, we have people with expertise in different areas, but it all comes back to improving life for the equine athlete. That's what equine sports medicine and rehabilitation is all about, and we've got a terrific mix of talent here to advance a specialty that's vital to the future of sporthorse care."

## Dr. McIlwraith Honored by Academy of Surgical Research

By Coleman Cornelius

**D**r. Wayne McIlwraith, a Colorado State University Distinguished Professor and world-renowned equine orthopaedic surgeon, recently received one of the highest honors in his field from the Academy of Surgical Research.

He earned the Jacob Markowitz Award for outstanding contributions to medicine through the art, science, and technology of experimental surgery. The award is conferred in honor of Jacob Markowitz, who helped establish surgical research as chief of experimental surgery and a professor of physiology at the University of Toronto.

Dr. McIlwraith, who is founding director of the CSU Orthopaedic Research Center, gained the honor for pioneering, developing, and refining arthroscopic surgery in the horse. He also was recognized for leading the development of large-animal models for the surgical repair of cartilage defects and evaluation of articular cartilage repair.

His discoveries have provided new insights for orthopaedic advances in human medicine. In fact, Dr. McIlwraith is the only equine surgeon to earn the award among more than two dozen medical luminaries who have discovered new surgical techniques and technologies to improve patient outcomes.

“It’s an honor to receive this award in light of the landmark work of previous recipients,” Dr. McIlwraith said. “I hope my own work has helped to advance surgical research by focusing on arthroscopic techniques and cartilage repair. This work wouldn’t be possible without the contributions of many other people, including surgical residents, graduate students, and both clinical and research colleagues.”

Dr. McIlwraith received the award during the Academy of Surgical Research annual

meeting in Clearwater Beach, Fla., in late September.

He also delivered the keynote address, “Arthroscopic Surgery in the Horse: Research to Address Limitations for Repair in Horses and Humans,” which detailed the evolution of arthroscopic surgery and development of equine models for surgical repair of cartilage defects. Cartilage is essential for joint

instance, the center is investigating use of gene therapy for equine osteoarthritis and stem-cell therapy for tendonitis. The center’s veterinary specialists also provide clinical care for top racehorses, cutting and reining horses, jumpers, and dressage horses.

In a sign of its leading-edge work, the center recently received a \$6 million gift from the Malone Family



*Dr. Wayne McIlwraith performs arthroscopic surgery on an equine patient.*

function, so its successful repair is significant in maintaining movement and performance, whether in humans or horses.

Fitting, then, that the National Football League Charities has been among the funding agencies to support Dr. McIlwraith’s investigation of new surgical techniques for knee injuries.

At the CSU Orthopaedic Research Center, Dr. McIlwraith and his colleagues conduct research aimed at novel methods for detecting, preventing, and treating musculoskeletal problems, especially arthritis and joint injury. For

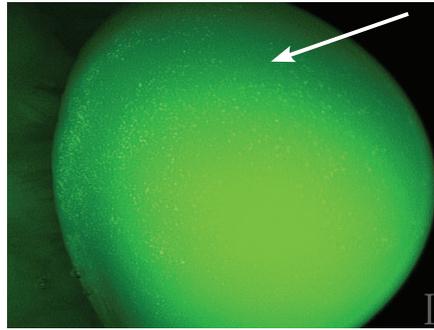
Foundation, led by media magnate and philanthropist John C. Malone, whose wife, Leslie Malone, is active at the top levels of U.S. dressage.

“Dr. McIlwraith’s newest honor, the Markowitz Award, is a tribute to his pioneering research in arthroscopic surgery, joint disease, and cartilage repair,” said Dr. Mark Stetter, a veterinarian and dean of the CSU College of Veterinary Medicine and Biomedical Sciences. “We’re very proud of the work he and his colleagues are doing to advance musculoskeletal innovations in our teaching, research, and clinical service.”

## Dosing Trial in a Large-Animal Model, and Validation of Repeat Administration for Treatment of Osteoarthritis

This research is part of our ongoing work to produce a better vector for gene therapy for treating osteoarthritis in horses. This study to evaluate different doses of a selected adeno-associated viral vector and IL-1ra gene was led by Dr. Laurie Goodrich, and also involved Drs. Wayne McIlwraith and Jude Samulski, as well as research associates Jennifer N. Phillips, Josh Greiger, and Steven Gray.

Previously, we described optimization of an scAAVIL-1ra gene therapeutic vector, and initially tested this therapy in an equine model. We verified that the vector would produce therapeutic levels of IL-1ra protein for up to six months. Using this vector, we carried out a dosing trial in six horses to verify protein levels and establish a dose of vector that would express significant levels of therapeutic protein for nine months. A



**Fig. 1: Fluorescent arthroscopy reveals fluorescing cells (indicated with an arrow) within the cartilage of the third carpal bone. These cells are genetically modified after injection with an AAVGFP vector into the middle carpal joint.**

novel endoscopy procedure was used to detect GFP fluorescence in the joint, and also confirmed successful uptake of the vector in both the synovial and cartilage tissues (Fig. 1). No evidence

of toxicity was detected, and no vector DNA was detected in contralateral joints based on fluorescence arthroscopy and quantitative PCR.

Immune responses to the vector were examined in each horse and revealed development of neutralizing antibodies (nabs) within two weeks of administration. These antibody levels persisted for the entire duration of the study, but did not lower protein expression intra-articularly. The possibility of re-dosing with a different serotype to attain therapeutic levels of protein in low-dosed animals was also investigated, and uptake of the vector was successful. This study is the first in a large-animal model to establish a dosing protocol and examine the neutralizing antibody response. Our next step in this investigation is to determine the clinical efficacy of scAAVIL-1ra to treat OA in a carpal chip fragment model.

## Bioengineering Laboratories Become an Integral Part of the Orthopaedic Research Center

For a number of years, the Orthopaedic Research Center and the Orthopaedic Bioengineering Laboratories have been closely linked. As of the summer of 2013, the Bioengineering Laboratories (previously OBRL) became part of the ORC. This change was associated with renovations to the research laboratories of both units, as well as expansion of Bioengineering Laboratories with Drs. Tammy Donahue and Seth Donahue joining Dr. Christian Puttlitz as principal investigators.

In the fall of 2013, the Bioengineering Laboratories and ORC underwent a major renovation from the top down, literally! A new roof has been placed over the Orthopaedic Research Laboratories building (previously ORC Laboratories and OBRL Laboratories). Starting with this new

gabled roof to match the rest of the ORC buildings, the laboratories were renovated inside to reflect new endeavors and improve space utilization. The new labs now include a dedicated machine shop, a materials testing space, specimen preparation space, centralized histology lab, wet lab, dedicated freezer room, microscope/imaging lab, and a micro-computer tomography room. We expect to have cell and tissue culture facilities soon as well. This remodel is reflective of the growing research in the laboratories and increasing needs.

With funded research from NASA, NIH, and NSF, as well as our industrial sponsors, these laboratories house research scientists, postdoctoral fellows, and more than 15 graduate and undergraduate student researchers. The labs are capable of soft- and hard-tissue

mechanical characterization; decalcified and non-decalcified histology; biaxial, axial, and torsional testing; imaging; spine and knee simulation testing; and standard molecular biology assays. Additionally, a newly installed X-ray has increased our imaging needs.

Dr. Tammy Haut Donahue joined CSU in December 2011 and now shares these laboratories with Dr. Christian Puttlitz. Dr. Puttlitz's research interests are mainly focused on using experimental and computation techniques to investigate orthopaedic conditions and their treatments. Examples of his current research include using the finite element method to study how loading changes

*continued on Page 8*

## Standing Arthroscopy

Many advances in equine musculoskeletal diagnostic imaging have been made in the last 10 years with the use of MRI and improved ultrasound machines. Unfortunately, improvement in diagnosing stifle pathology has not benefited much from these improvements. The size of the equine stifle precludes it from being imaged in almost all MRIs, and the geometry of the bones shield ultrasound beams from being able to see all aspects of the joint. This is disappointing, because the stifle is a joint that is commonly injured in many disciplines and has been reported to cause pain in up to 40 percent of athletes at some point in their careers.

Many times radiographic images don't show the problem because they show very little soft tissue, which is a common cause of stifle soreness. Clinicians at the Orthopaedic Research Center have helped improve the ability to obtain a definitive diagnosis in the field using a flexible needle arthroscope in the standing horse. The procedure utilized new fiber optic technology and an arthroscope that is the same size as the needle used to inject a horse's joint (1.2 mm).

With this needle scope, a complete exploratory can be performed on a horse while it is standing and sedated. This

procedure is obviously much improved over the horse requiring general anesthesia and the use of more traditional arthroscopy. This exam can be completed in about 30 minutes and can be done in most any clean environment. The procedure to date has been used in a diagnostic sense, i.e., to make a diagnosis and then determine the most appropriate treatment, which in many cases is medical and obviates the need for a general anesthesia surgical procedure. However, in some cases, routine arthroscopy is needed, and this procedure can let the surgeon know what to expect and if special treatments or instruments are needed.

This procedure has been carried out in more than 100 joints by Dr. David Frisbie and presented at advanced arthroscopy courses around the world, as well as at the 2013 College of Veterinary Surgeons meeting, and will be presented at the annual convention of the American Association of Equine Practitioners. If you have interest in the procedure, please contact Dr. Frisbie at the ORC at (970) 297-4165.



*Dr. David Frisbie performs standing arthroscopy, a technique he developed.*

## Bioengineering Laboratories

*continued from Page 7*

in the spine following intervertebral disc replacement. Through funding from NASA, Dr. Puttlitz has developed an ovine model of simulated space flight to understand bone loss during such events as missions to Mars. Dr. Puttlitz also serves as the associate chair for graduate studies in the Department of Mechanical Engineering. Dr. Haut Donahue has an active research program that integrates biology and engineering, leading to a

better understanding of the mechanical behavior and cellular responses of biological tissues; namely the knee joint meniscus. Research in the laboratory aims to find ways of preventing the onset of diseases, such as osteoarthritis, a painful and debilitating disease caused by bone-on-bone wear on the knee joint surface. A multiscale approach utilizing experimental techniques is employed. Upon completion of the remodel, Dr.

Seth Donahue will join the laboratory with research in bone mechanics and biology. Dr. Seth Donahue has investigated the use of parathyroid hormone (PTH) to treat osteolytic lesions due to osteosarcoma, to improve bone allografting, and to heal critical sized bone defects with tissue engineered scaffold. Additionally, he has studied bone and fat metabolism in hibernating bears, marmots, and pocket mice.

## Promotions

### Dr. David Frisbie

Dr. David Frisbie was promoted to full professor on July 1, 2013. He came to CSU as an equine surgical resident in 1993, and did a surgical residency from 1993-1996 and a Ph.D. from 1996-1999. He then became an assistant professor, then an associate professor, and now a full professor. Congratulations, Dr. Frisbie!



### Dr. Melissa King

Dr. Melissa King was recently promoted to the CSU faculty as assistant professor (tenure track). Dr. King completed her Ph.D. at the Orthopaedic Research Center in 2011, assessing the efficacy of underwater treadmill exercise to diminish the progression of carpal osteoarthritis. Dr. King is also board certified as a diplomate of the American College of Sports Medicine and Rehabilitation, and has been the lead clinician for the Equine Sports Medicine and Rehabilitation Service since 2011.



### Dr. Valerie Moorman

Dr. Valerie Moorman is now a new faculty member at the CSU James L. Voss Veterinary Teaching Hospital as an assistant professor in equine surgery and lameness. Dr. Moorman completed her Ph.D. at the Orthopaedic Research Center in 2012, investigating hoof-mounted inertial measurement units to examine real-time kinematics in both normal and lame horses. Dr. Moorman is board certified as a diplomate of the American College of Veterinary Surgeons and was formerly the ORC staff veterinarian while pursuing her Ph.D.



*Congratulations to Drs. Frisbie, King, and Moorman for their well-deserved promotions!*

## New Graduate Students and Staff

### Dr. Philippe Manchon

Dr. Philippe Manchon joined the Equine Sports Medicine and Rehabilitation Service's residency program in July 2013, and is looking forward to working with CSU's great equine team. Dr. Manchon is originally from Queensland, Australia, where he grew up raising and competing on Western performance horses. He received his veterinary degree at the University of Queensland, graduating in 2010, at which time he accepted a scholarship to continue his clinical training at the university's equine hospital. Dr. Manchon's interest in Western performance led him to pursue an internship in 2011 at Weatherford Equine Medical Center, Weatherford, Texas, in the heart of cutting horse country. He did an additional year in that practice before joining us at CSU.



### Dr. Brad Nelson

Dr. Brad Nelson recently started in a Ph.D. program at the Orthopaedic Research Center.



Dr. Nelson graduated from the University of Wisconsin-Madison with a D.V.M. in 2009, and then completed an equine internship in surgery and medicine at Washington State University, followed by a residency in large-animal surgery at CSU. He also received a master's degree in clinical sciences as part of the residency program. Dr. Nelson's Ph.D. research will focus on articular cartilage imaging, specifically in the use of contrast enhanced computed tomography as a method to improve the diagnosis of articular cartilage injury. Dr. Nelson replaces Dr. Valerie Moorman as the staff veterinarian at the ORC. He is also performing duties as an emergency large-animal surgeon.

### Lisa Riseman

Lisa Riseman is the new Orthopaedic Research Center's MRI and sports medicine technician. She received her B.S. in equine sciences from CSU in 2013, and has worked at the CSU VTH since 2010 as a surgery and radiology technician. Riseman has a background in eventing and focused much of her undergraduate education on the anatomic study of domestic animals.



## Awards

### Dr. Chris Kawcak Named to ACVSMR Board of Directors

Dr. Chris Kawcak was elected to the board of directors of the American College of Veterinary Sports Medicine and Rehabilitation in 2013 and will serve a three-year term. He replaces the position vacated by the end of Dr. Wayne McIlwraith's term on the board. Dr. Kevin Haussler remains as secretary/treasurer of the ACVSMR. The ACVSMR was initially accredited by the American Veterinary Medical Association in 2009, and now boasts more than 60 diplomates. Initially, there were 27 charter diplomates, which included Drs. Haussler, Kawcak, David Frisbie, and McIlwraith. Dr. Melissa King has since passed the examination and is an equine diplomate, and Dr. Felix Duerr, a small-animal orthopaedic surgeon at CSU, has become certified by examination as well. CSU currently has the only equine ACVSMR residency program and one of two small-animal residency programs in the country.

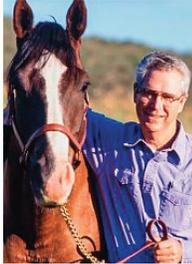
### Dr. Brad Nelson Receives ACVS Residency Award

Dr. Brad Nelson received the Outstanding Surgical Resident Award from the American College of Veterinary Surgeons during the ACVS Veterinary Symposium held in San Antonio, Texas, in October. The award recognizes a resident who has conducted clinically important research.

## In Memoriam

### Dr. James L. Voss

James L. Voss, a giant in the life of Colorado State University and namesake of CSU's world-renowned Veterinary Teaching Hospital, died in July following a long illness. He was 79.



Dr. Voss, a three-time CSU alumnus from a family farm near Grand Junction, Colo., built his career at CSU from 1958 until his retirement in 2001, first as an equine ambulatory clinician, then as a leading veterinarian in equine reproduction, and head of the Department of Clinical Sciences. He went on to be dean of the CSU College of Veterinary Medicine and Biomedical Sciences for 15 years. He was a past president and distinguished life member of the American Association of Equine Practitioners.

He mentored a large number of prominent CSU alumni, faculty, and staff, including University Distinguished Professors and President Tony Frank. As Dr. Wayne McIlwraith, director of the ORC and a University Distinguished Professor said, "He was a critical mentor to me as department head; he let us get on with what we are doing, but was always encouraging. When he was dean, he challenged me to build the world's best Orthopaedic Research Center at a veterinary school, and what we have now started with us developing a shared vision."

### Dr. Robert Kelly "Bob" Shideler

Robert Kelly "Bob" Shideler, 89, died in September after a lengthy illness. He was born in Mancos, Colo., and graduated from Carbondale High School in 1941. He then enrolled at Colorado A&M in animal husbandry. Midway through his junior year, he joined the U.S. Navy, serving in the



medical corps in Okinawa, Iwo Jima, and the Philippines on the USS Lubbock, then returning to veterinary school in 1946.

Dr. Shideler developed a private veterinary practice in Danville, Ill., and continued it in Sardis, Miss., for 25 years. It is now owned by his son, Dr. Steven Shideler. Dr. Bob Shideler served as president of the Mississippi Veterinary Medical Association and was its Veterinarian of the Year; served on AVMA Council on Education; American Association of Equine Practitioners board of directors; and was AAEP president and distinguished life member.

In 1974, Dr. Bob Shideler accepted a faculty position in equine ambulatory medicine and reproduction at Colorado State University, where he served until retiring at 75. He also served as interim director of the Department of Equine Sciences for three years. He was an avid alumnus and was chosen president and Outstanding Alumnus of the CSU 50 Year Club. He was a good friend to the ORC, bringing visitors to proudly show it off.

### Dr. Duane Moore

R. D. (Duane) Moore, of Fountain, Colo., passed away unexpectedly after a short illness Sunday, July 28, in Albuquerque, N.M. He was 74 years old.



Dr. Moore was born on Dec. 1, 1938, in Longmont, Colo., and graduated from Frederick, Colo., high school with the class of 1956. He received his D.V.M. from Colorado State University in 1963, and began a mixed practice in 1964 that he continued for 20 years. In the early 1970s, Dr. Moore became active in the business of raising and racing quarter horses as well as building a racetrack practice. Racehorse medicine became his lifelong passion. He was a well-known and respected practitioner, who often consulted on difficult cases and was called for expert testimony before various racing commissions. He was a past president of the Rocky Mountain Quarter Horse Association, and served on the Advisory Board of the Colorado Pari-mutuel Equine Research Program. He regularly visited the Orthopaedic Research Program as part of this group.



*Arthros*

#### Mailing Address:

Colorado State University  
College of Veterinary Medicine and  
Biomedical Sciences  
Equine Orthopaedic Research  
Center  
Fort Collins, CO 80523-1678  
Phone: (970) 297-4165  
Fax: (970) 297-4118  
E-mail: [katie.briggs@colostate.edu](mailto:katie.briggs@colostate.edu)  
Web: [www.csuequineortho.com](http://www.csuequineortho.com)

#### Gail Holmes Equine Orthopaedic Research Center

**Director:** Dr. Wayne McIlwraith

**Editors:** Dr. Wayne McIlwraith and Katie Briggs

**Graphic Design:** Communications and Creative Services, Colorado State University

*Arthros is an annual Colorado State University Equine Orthopaedic Research Center publication.*

#### Our Purpose:

*To find solutions to musculoskeletal problems, especially joint injuries and arthritis, in horses and humans.*

#### Our Philosophy:

*To offer the best treatment of clinical cases possible, with continued and critical assessment of our results; to use these results to change our treatments; to point our research toward prevention of problems we cannot treat effectively or that cause permanent clinical damage.*

#### Our Goals:

*To find new methods to heal joints already damaged; to use state-of-the-art research techniques to find ways to prevent the occurrence of joint diseases and musculoskeletal injuries; to find methods of early treatment to prevent permanent damage when joint disease does occur.*

## Arthroscopic Surgery Courses at CSU in August 2013

Historically, the first course on diagnostic and surgical arthroscopy on the horse was presented at CSU by Dr. Wayne McIlwraith in June 1983, and the first advanced arthroscopic surgery course was given in 1988, with two days of lecture and laboratories. The most recent basic and advanced courses were held Aug. 22 and 23, 2013, and we remain the center for arthroscopic surgery training in the U.S. and internationally.

The advanced course this year involved Drs. Alan Nixon from Cornell and Ian Wright from Newmarket Equine Hospital UK, joining Drs. McIlwraith, David Frisbie, Chris Kawcak, and Laurie Goodrich at

CSU. Drs. Nixon and Wright are co-authors with Dr. McIlwraith of the upcoming fourth edition of *Diagnostic and Surgical Arthroscopy in the Horse* (this textbook in its first two editions was written by Dr. McIlwraith; Drs. Nixon and Wright joined Dr. McIlwraith for the third edition). Dr. Frisbie also contributed a section to the fourth edition on his newly developed standing arthroscopy technique.

Arthroscopic surgery and related rehabilitation and postoperative techniques continue to evolve to a higher level, and the advanced course presents the most recent information, together with the evidence

supporting the use of various techniques. Attendees came from the U.S. as well as internationally. Most delegates to the course are already board-certified surgeons (either through the American College of Veterinary Surgeons or the European College of Veterinary Surgeons).

Following the Advanced Arthroscopic Surgery course, Dr. Frisbie led a course on standing arthroscopy and ultrasound examination for diagnosis of stifle injury and disease with Dr. Myra Barrett, Dr. Kurt Selberg, and Dr. Natasha Werpy, as well as Drs. Kawcak and McIlwraith (see the article on Page 8, "Standing Arthroscopy").

## Advisory Board 2013

### Gail Holmes

Quarter Horse Owner and Breeder

### Rick Arthur, D.V.M.

Racetrack Veterinarian, California  
Past President, American Association of Equine Practitioners

### Thomas Bailey

Cutting Horse Owner and Breeder, Iron Rose Ranch

### Larry Bramlage, D.V.M.

Past President, American Association of Equine Practitioners, American College of Veterinary Surgeons  
Specialist Equine Surgeon, Rood & Riddle Equine Hospital

### Lindy Burch

Hall of Fame/Cutting Horse Trainer and Breeder

### Mark Dedomenico, M.D.

Thoroughbred Owner and Breeder  
Pegasus Thoroughbred Training and Rehabilitation Center

### Ron Ellis

Thoroughbred Racehorse Trainer

### John Halley, M.V.B. (D.V.M.)

Veterinarian for Coolmore and Ballydoyle, Ireland

### Bobby Lewis, D.V.M.

Elgin Veterinary Hospital  
Past President, American Association of Equine Practitioners

### Richard Mandella

Racing Thoroughbred Trainer, Racing Hall of Fame

### Wayne McIlwraith, B.V.Sc. (D.V.M.), Ph.D.

Past President, American Association of Equine Practitioners, American College of Veterinary Surgeons, and Veterinary Orthopaedic Society  
Director, Orthopaedic Research Center

### Maria I. Niarchos-Gouazé

Thoroughbred Owner, Europe

### Dan Rosenberg

Rosenberg Thoroughbred Consulting

### Barry Simon, D.V.M.

Thorn BioScience

### Melanie Smith Taylor

Olympic Gold Medalist, Show Jumping

### Jon Winkelried

Cutting Horse Breeder  
Marvine Ranch

### Martin Wygod

Thoroughbred Owner, California  
President and CEO, WebMD

## Research Sponsors 2013

Arthrex Bio Systems

Arthrodynamic Technologies Inc.

Grayson-Jockey Club Research Foundation

Pfizer Inc. – Animal Health

PulseVet

Luitpold

National Institutes of Health

Progenteq

Steadman Philippon Research Institute

University of Cardiff

**Colorado State University**

**15th Annual Online Stallion Auction**

*to benefit musculoskeletal and reproductive health in horses*

**January 15, 2014 to January 18, 2014**

Bid Online

Go to [www.csuequineortho.com](http://www.csuequineortho.com) and select the Stallion Auction link.

Bids do not include chute fees, booking fees or associated reproductive and veterinary costs.

How You Are Helping

When you purchase a breeding, you are helping to improve horse health. Proceeds of the Stallion Auction benefit the outstanding equine research programs at CSU's Orthopaedic Research Center and the Equine Reproduction Laboratory.

Questions?

Call (970) 297-4165 or e-mail [Paula.Vanderlinden@ColoState.edu](mailto:Paula.Vanderlinden@ColoState.edu).





Orthopaedic Research Center  
 College of Veterinary Medicine and Biomedical Sciences  
 1620 Campus Delivery  
 Fort Collins, Colorado 80523-1620

**YES! I/We want to support the work of the Orthopaedic Research Center at Colorado State University.**

Enclosed is my/our gift of:

\$50  \$100  \$250  \$500  \$1,870  Other \$ \_\_\_\_\_

Please apply this gift to:

Equine Orthopaedic Research, #42113

Other \_\_\_\_\_  
 (please write in fund)

Name \_\_\_\_\_

This gift is from:  me.  my spouse and me.  my partner and me.

Spouse's/Partner's Full Name \_\_\_\_\_

Address, City, State, ZIP \_\_\_\_\_

Home Phone No. ( \_\_\_\_\_ ) \_\_\_\_\_

E-mail \_\_\_\_\_

Home  Work

This gift in honor/memory of \_\_\_\_\_  
 human/animal (circle which).

Please send notification of my gift to the following:

Name \_\_\_\_\_

Address \_\_\_\_\_

City, State, ZIP \_\_\_\_\_

Three ways to make your contribution:

Enclosed is a check payable to the CSU Foundation.

Charge this gift to my/our:

VISA  MasterCard  American Express

Card Number \_\_\_\_\_

Expires \_\_\_\_/\_\_\_\_ (mm/yyyy) Card Security Code \_\_\_\_\_

Name on Card \_\_\_\_\_

Signature \_\_\_\_\_

Give online at [www.advancing.colostate.edu/ORC](http://www.advancing.colostate.edu/ORC).

Please send me information about including CVMBS in my will.

Please return this form with your gift to: Colorado State University  
 Foundation, P.O. Box 1870, Fort Collins, CO 80522-1870.

If you have questions or need additional information,  
 call Katie Briggs, Equine Orthopaedic Research Center,  
 at (970) 297-4266, or e-mail [katie.briggs@colostate.edu](mailto:katie.briggs@colostate.edu).

