



ORTHOPAEDIC RESEARCH CENTER

ARTIFERS

CSU GAIL HOLMES EQUINE ORTHOPAEDIC RESEARCH CENTER | SPRING/SUMMER 2018

NUMBER 22

ORC INVESTIGATORS SPEARHEAD DEVELOPMENT OF STANDING COMPUTED TOMOGRAPHY, WITH SUPPORT FROM LOUIS L. BORICK FOUNDATION

FOR MANY YEARS NOW, researchers in the Orthopaedic Research Center at Colorado State University have identified

Over the last several years, Drs. Chris Kawcak and Wayne McIlwraith have worked with several collaborators and companies to try to leverage the

when, thanks to a gift from The Louis L. Borick Foundation, the ORC investigators were able to collaborate with Epica Medical Innovations to begin design and development of a prototype. The collaborative team has so far developed the specific designs, and the prototype device should be developed in the fall of 2018. Once developed, this device will be placed at CSU, and the CSU team will work to optimize its use in the standing horse. Epica Medical Innovations already has several larger devices in the veterinary field and is best positioned to bring this device to market for clinical use by veterinarians.

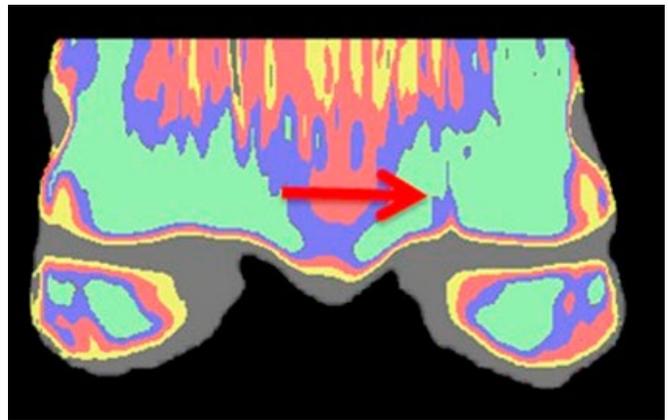


Concept plan for the new CT extremity scanner

the importance of computed tomography for identifying subtle injuries in athletic horses. As investigators have shown, these subtle injuries can sometimes have catastrophic consequences, yet if detected early enough, management of these horses can result in athletic soundness. However, there are only a few ways to acquire this information without putting a horse under general anesthesia and performing examination with standard human computed tomographic devices. Although a robotic unit does exist for acquiring this information in the standing horse, its expense and complicated structure make it difficult to use and susceptible to artifact.

development of a computed tomographic device that can be used in the standing horse

Once in the marketplace, the standing computed tomographic device will be



CT image demonstrates a crack in the bone (arrow).

and yet is relatively simple to use and inexpensive. That breakthrough came last year

affordable for veterinarians and provide three-dimensional imaging of the bones and soft

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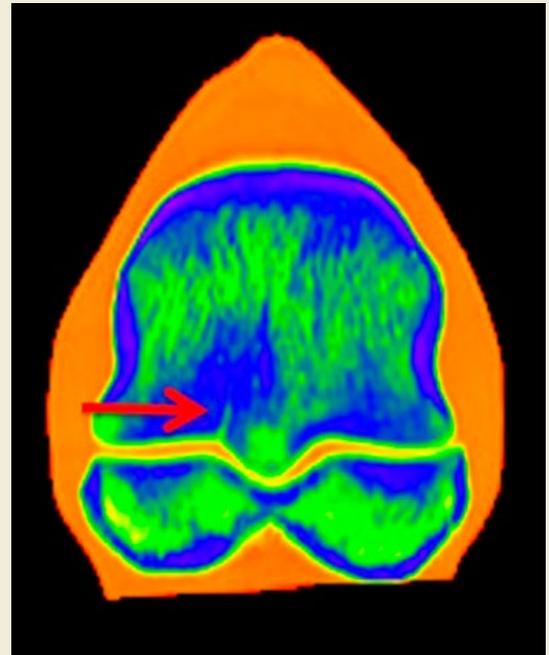
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STANDING COMPUTED TOMOGRAPHY *continued from Page 1*

tissues of the lower limbs of horses. Investigators in the Orthopaedic Research Center continue to develop ways to enhance imaging of bone and soft tissues in the lower limbs, and this effort takes many of the basic research findings from the lab and puts them into play in the clinical environment.



CT image demonstrates a hairline crack in the bone (arrow).

Investigators are grateful to Robert Borick and The Louis L. Borick Foundation in seeing the vision and the impact that this type of device will have on the equine industry. This project would be possible only with a \$500,000 grant from the Borick Foundation. The same foundation has donated a total of \$910,000 to date, having previously provided funding for new surgical lights containing video cameras for the ORC surgical suite as well as new cameras for our gait analysis system. ■

LETTER FROM DRS. DAVE FRISBIE AND CHRIS KAWCAK

2017 was another great year, filled with exciting new growth for the ORC. Featured in this issue is the work of Dr. Chris Kawcak and Dr. Wayne McIlwraith spearheading development of a CT scanner for standing horses. Their work also involves keeping an eye on the commercial aspects of such a diagnostic tool – so important to bringing it to market. As often is the case for the ORC and novel technology, this work would not be possible without the generous support of donors – in this case, Robert Borick and The Louis L. Borick Foundation.

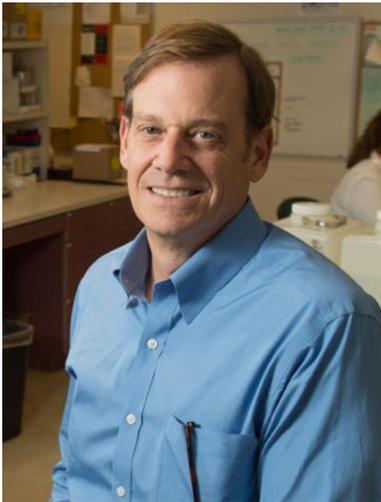
The C. Wayne McIlwraith Translational Medicine Institute building is still on track for substantial completion, i.e., turning the keys over at the end of November 2018. We are planning a grand opening, which most likely will be early to mid-May 2019. Mark your calendars!

Also in this issue is a summary of new faces contributing to the ORC. Our faculty continues to grow in the areas of Diagnostic Imaging and Sports Medicine and Rehabilitation, strengthening our clinical and research efforts in these areas.

This year also brought new and exciting information from an impressive list of visiting speakers and scholars.

We want to share with you the question we were asked most often in 2017: “How’s Wayne’s transitional retirement going?” Our response: “His productivity looks similar to years past, even working 40 percent.* 😊 ”

Please enjoy this installment of *Arthros*, and we look forward to our next issue, which will profile the exciting collaborations of human and veterinary medicine in both clinical fields and basic science.



A handwritten signature in black ink, appearing to read 'Dave Frisbie'.

Dave Frisbie, Director of Research,
Orthopaedic Research Center



A handwritten signature in black ink, appearing to read 'Chris Kawcak'.

Chris Kawcak, Director of Equine
Clinical Services

*Our state retirement management mandates only a 40 percent workweek for people on transitional retirement.

PIVOTAL FUNDING FOR THE YEARLING-2-YEAR-OLD REPOSITORY STUDY OF SESAMOIDITIS AND STIFLE LESIONS HAS NOW BEEN GAINED FROM THE GRAYSON-JOCKEY CLUB RESEARCH FOUNDATION AS WELL AS KEENELAND ASSOCIATION AND THE FASIG-TIPTON COMPANY

THE THOROUGHBRED SALES radiographic-ultrasonographic study led by Colorado State University's Orthopaedic Research Center veterinarians, Drs. Wayne McIlwraith, Frances Peat, Chris Kawcak, and Kurt Selberg, and Dr. Jeff Berk from Lexington, Ky., has gained widespread support as it continues its successful run. This study investigates two of the most often discussed controversial issues at sales by buyers, sellers, and veterinarians alike: radiographic findings in the proximal sesamoid bones of the fetlock, with associated suspensory branch changes, and radiographic findings in the medial femoral condyle of the stifle. The study commenced at the 2016 Keeneland September Yearling Sale, involving 2,795 yearlings, and continued through the 2-year-old sales in 2017. Researchers were able to follow 78 percent of all eligible 2-year-olds that had consignor permission for radiographic inclusion in the study as yearlings, due to great understanding within the industry of the need for this research.

Studies of this sheer size require considerable research funding. Three major industry organizations have recognized the need for this research and its potential to positively impact the Thoroughbred industry, as it seeks to uncover critically sought-after information regarding the significance of sesamoiditis and stifle lesions. The Keeneland Association has committed \$100,000 toward the successful completion of this work. Fasig-Tipton Company has also made a \$50,000 commitment toward the research. The Grayson-Jockey Club Research Foundation has approved a grant application submitted by the researchers for an additional \$143,624. Researchers are now in the final phase of collecting funding contributions from private donors who believe in the value of this study and are in a position to support it financially.

Since repositories were introduced to Thoroughbred auction houses in the 1990s, a degree of uniformity in radiology has developed, particularly for OCD lesions. However, some radiographic changes remain a persistent source of controversy for sellers, buyers, trainers, and veterinarians. That is why sesamoiditis and lucencies or subchondral cystic lesions of the medial

and could not address the stifle lesion question at all because of the lack of digital radiographs.

Since then, there has been investigation of sesamoiditis relative to development of suspensory ligament branch injury by Drs. Jonathan McLellan and Sarah Plevin in Florida. A study that specifically investigates



Technicians take a radiograph.

femoral condyle are the focus of this study. An initial study prior to both digital radiographs and the repository system was performed 15 years ago by Drs. McIlwraith, Kane, Park, Rantanen, Moorhead, and Bramlage. A second study prior to digital radiographs was performed by Drs. Spike-Pierce and Bramlage. These studies led to more questions about sesamoiditis,

sales horses and follows them at yearling and 2-year-old sales with radiographic and ultrasonographic examination (as appropriate) has never been performed.

The first phase of the study was conducted at the 2016 Keeneland September Yearling Sale with excellent collaboration from the sales company and consignors. Consignors

presenting yearlings at this sale were asked permission to include the yearlings in the radiographic and/or ultrasonographic portions of this study. Radiographic permission was granted by 71 consignors, resulting in a total of 2,795 yearlings, or 74 percent of all yearlings presented for sale that had radiographs available. Of these 2,795 yearlings, suspensory branch ultrasonography on 704 horses was performed on farms before they shipped to Keeneland. The radiographs have been evaluated for changes in the sesamoid bones and the medial femoral condyles of the stifles. The ultrasound images will be evaluated for abnormalities involving the suspensory ligament branches at their insertion onto the sesamoid bones.

The second phase of this project followed horses that had radiographs included in the study as Keeneland September yearlings, to five of the major 2-year-old sales in 2017: the Fasig-Tipton Gulfstream Sale, OBS Select Sale, OBS Spring Sale, Fasig-Tipton Midlantic Sale, and OBS June Sale. Permission for inclusion in the second phase of the study was granted by 45 consignors of 2-year-olds, for 78 percent of eligible horses. This amounted to 473 2-year-olds on which to evaluate radiographs, and 415 of these horses also had suspensory branch ultrasounds performed for the study prior to the under tack shows. Researchers will again evaluate the sesamoid bone/suspensory

branch complex and the radiographic stifle lucencies in this group of horses.

The third phase of the project will follow the racing performance of these horses, culminating at the end of their 3-year-old year. Paired radiographs and ultrasound images will enable the progression, regression, or static nature of certain radiographic and ultrasonographic findings to be studied, under the conditions in which these sale horses are managed.

“This study is badly needed,” said Dr. Berk, whose equine veterinary career exclusively involves sales work. “Critical decisions have to be made at the sale that affect both consignors and potential buyers that preclude sales of horses when the decision is sometimes based on no evidence of a given lesion leading to unsoundness.”

“Modern medicine decisions are supposed to be based on evidence, and these two problems are excellent examples of decisions being made without adequate data,” said Dr. McIlwraith. “No evidence-based work has been published that pairs yearling and 2-year-old sale radiographs for individual horses.”

This study will be the largest of its kind and will yield information that will be extremely useful to those involved in the selection process of sales horses. It

will aid veterinarians in providing their buying and selling clients with a more accurate assessment of the significance of these findings. It will also help those in the Thoroughbred industry gain an understanding that not all radiographic findings are contributory factors to any given horse’s suitability for racing. With the cooperation of the sales companies, consignors, owners, and veterinarians, this study has gained great traction. All those involved in the sales process stand to benefit from this much needed, and now highly anticipated, information.

Funding contributions from the Keeneland Association (\$100,000), Fasig-Tipton Company (\$50,000) and, most recently, the Grayson-Jockey Club Research Foundation (\$143,624) total \$293,624. Substantial cost savings in the second year of the study have also enabled a reduction in the overall budget to \$425,000 for completion of the research. The researchers are now looking to individuals, farms, or organizations, who believe in the importance of this research and are in a position to support it financially, to contribute to the remaining \$135,000 required for the study. Donations in the region of \$5,000 from 27 individuals, farms, or organizations would complete the researchers’ fundraising efforts. Parties interested in making a contribution to the study through Colorado State University may contact wayne.mcilwraith@colostate.edu. ■

Arthros

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Communications and Creative
Services, Colorado State University

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.

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VISITING SPEAKERS 2016-2017

We had a number of renowned speakers visit us this past year. These visitors all presented excellent seminars on their work to our group.



FELICITY ROSE, Ph.D., AND MORGAN ALEXANDER, Ph.D.

“Biomaterials for bone regeneration – from materials development to new biomaterials discovery”

Drs. Felicity Rose and Morgan Alexander are from the University of Nottingham. They have led the field of biomaterials development for musculoskeletal tissue regeneration, and invented and commercialized new systems for the delivery for biopharmaceuticals, specifically for the delivery of stem cells and growth factors to support new bone formation. Their research has focused on the use of synthetic biodegradable polymers for this purpose and, in particular, the control of scaffold architectures and controlled release of growth factors from microparticles to support three-dimensional tissue growth. Dr. Rose is an associate professor and reader in tissue engineering and is head of the Division of Regenerative Medicine and Cellular Therapies, School of Pharmacy, at Nottingham. Dr. Alexander is professor of biomedical surfaces, director of the EPSRC Programme Grant in Next Generation Biomaterials Discovery, and a Wellcome Trust senior investigator. They came to visit our program at the initiation of Dr. Ian Orme, who had previously visited Nottingham to discuss future collaborative opportunities.



DR. YUEH LEE, Ph.D.

“Clinical applications of carbon nanotube X-ray sources”

Dr. Yueh Lee is an assistant professor of radiology and neuroradiology in the Department of Radiology at University of North Carolina at Chapel Hill. He attended medical school, residency, and fellowship all at the University of North Carolina at Chapel. He is also an assistant professor in the Department of Physics, where he has worked with Dr. Otto Zhou around the area of tomosynthesis and development of the carbon nanotube CT scanner. Dr. Chris Kawcak is collaborating with both Drs. Lee and Zhou on the possible use of tomosynthesis to better characterize orthopaedic injuries in horses. Development of carbon nanotube technology is currently at the forefront of revolutionizing diagnostic imaging for X-ray, tomosynthesis, and computed tomographic evaluations. Tomosynthesis gives a limited three-dimensional view of a structure and may provide benefit for characterizing damaged tissues.

**LISA A. FORTIER, D.V.M., Ph.D., DACVS**

“Biologics for the prevention of arthritis”

Dr. Lisa Fortier is a professor of surgery at Cornell University at Ithaca. She received her D.V.M. from Colorado State University and completed her surgical residency training at Cornell University. She is board certified with the American College of Veterinary Surgeons and is an active equine orthopaedic surgeon at Cornell in Ithaca and at Cornell Ruffian Hospital in Long Island, N.Y. She has published more than 100 manuscripts in subjects related to sports medicine and is a recognized world leader of regenerative medicine for both equine and human athletes. Dr. Fortier’s research program includes investigations of the intercellular pathways involved in the pathogenesis of osteoarthritis as well as the clinical application of stem cells and biologics, such as platelet-rich plasma for cartilage repair and tendon injuries. She has received a number of awards and is a past president of the International Cartilage Repair Society. Her talk focused on a review of more recent work in biologics for the prevention of arthritis, which also included a new model of articular cartilage repair that she had developed in the tarsocrural joint of the horse.

**DARRYL D'LIMA, M.D., Ph.D.**

Dr. Darryl D'Lima visited Oct. 9, 2017, to discuss collaboration in our mutual interest in osteoarthritis and cartilage injury. Dr. D'Lima is director of orthopaedic research at the Shiley Center for Research and Education at Scripps Clinic in San Diego, Calif. He holds positions in both the Division of Arthritis Research at the Scripps Research Institute and at the Scripps Translational Science Institute, where he is an associate professor. He also holds the Clifford W. Colwell Jr. Medical Director chair in SCORE. He conducts research on cartilage injury as well as investigating new therapeutic approaches to cartilage regeneration. His other research interests and activities include examining joint stresses and kinematics in cadaver and computer models, wear in artificial hip and knee joints, and knee forces in activities measured by SCORE’s electronic knee. Dr. D'Lima received the prestigious Nicolas Andry Award in 2011 from the Association of Bone and Joint Surgeons for his groundbreaking electronic knee prosthesis, known as the “e-knee.” This unique “smart” prosthesis contains a computer chip that measures forces inside the knee while the patient participates in various activities, such as walking, climbing stairs, and exercising, and researchers can use this data from the e-knee to understand how forces affect the knee joint. Scripps made history in 2004 when Dr. Clifford Colwell implanted the world’s first e-knee into a patient at Scripps Green Hospital and, since 2004, three additional patients have received e-knees. These newer implants measure forces in the knee experienced during the rehabilitation process.

VISITING SPEAKERS

continued



LARRY CHAMLEY, Ph.D., FSRB

“Discussions of the potential of extracellular vesicles of stem cells in therapies for osteoarthritis and other conditions”

Professor Larry Chamley is professor in obstetrics and gynecology in the School of Medicine at the University of Auckland. His areas of expertise are reproductive biology and reproductive immunology. Dr. Chamley is collaborating on a project on trophoblasts derived stem cells and their therapeutic use with Dr. Wayne McIlwraith and Dr. Dave Hanlon in New Zealand. His work demonstrating the potential value of these cells and, in particular, their extracellular vesicles to provide therapeutic value in osteoarthritis, as well as repair of other musculoskeletal injuries, was particularly informative.



DR. LARRY BONASSAR, Ph.D.

Dr. Larry Bonassar is a professor at Cornell University in the departments of Biomedical Engineering and Mechanical and Aerospace Engineering. His seminar title was “Tissue engineering of cartilage and fibrocartilage using 3-D printing and injection molding.” Dr. Bonassar’s laboratory focuses on the regeneration and analysis of musculoskeletal tissues. The approach involves a multidisciplinary strategy using techniques in biomechanics, biomaterials, cell biology, and biochemistry. Current research aims in his laboratory include interactions of cells with biomaterials, with a focus on grafting cell adhesion peptides to study the way in which cells sense their environment. This work supports novel approaches to generate biological structures at the tissue level. Dr. Bonassar received a B.S. in biomedical engineering, material science and engineering from Johns Hopkins University, and M.S. and Ph.D. in material science and engineering from Massachusetts Institute of Technology.



JEFF BERK, V.M.D.

“A review of radiographs at public auction in the USA, their significance and impact on sales, and their relevance to subsequent performance”

Dr. Jeff Berk received his V.M.D. from the University of Pennsylvania in 1981 and currently has a practice focused on evaluation of yearlings and 2-year-olds at sales. Because of the experience and expertise he has acquired in this area, Dr. Berk was invited to give the above presentation and was included as an investigator in our current project on radiographic and ultrasonographic changes in yearlings at the Keeneland sale and further examination of the same individuals at 2-year-old sales in the U.S. He is also the current president-elect of the American Association of Equine Practitioners.

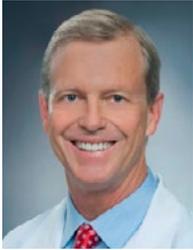
**KATIE TRELLA, Ph.D.****“Hypoxia in tendinopathies: from epigenomics to chondroid hyperplasia”**

Dr. Katie Trella has a bio below, but her doctorate and postdoctorate work focused on the study of animal models of musculoskeletal disease. Her talk outlined the significance of her research with tendinopathy, or chronic tendon injury, affecting approximately 2 percent to 3 percent of the human population, with rates as high as 40 percent reported in high-risk populations, including athletes and occupational workers. Additionally, these injuries are prevalent in racehorses, non-racehorse athletes (jumpers, eventers, and polo ponies), and working horses, with incidences ranging as high as 43 percent. Currently, no gold standard for treatment exists, as the development of injury is still poorly understood. Thus, there exists a need to establish novel treatment regimens to promote expedited and enhanced healing. She is approaching this problem by utilizing animal models of tendon disease to study chemical, structural, and functional properties to assess disease progression and healing.

Because tendons are relatively avascular (low number of blood vessels), with nutrition to the body of the tendon relying on fluid movement from surrounding tissues, tendons are naturally hypoxic (2 percent to 4 percent oxygen, as compared to 20 percent oxygen for liver, muscle, etc.), and it is hypothesized that these conditions contribute to the tissue’s poor healing capacity. Upon initial injury, hypoxia signaling regulates downstream pathways, including angiogenesis (blood vessel formation), glucose metabolism, and cellular changes, to minimize stress to the tissue. For her doctorate work, Dr. Trella sought to determine the role that hypoxia signaling contributed to tendon injury and healing using a mouse model of induced tendinopathy. Through the analysis of 84 proteins related to hypoxia signaling, an epigenetic (gene expression modification) role for insulin growth factor binding protein 6 (Igfbp6), a novel factor in tendon injury, was discovered. Additionally, activated expression of proteins associated with glycolysis, glucose transport, lactic acid transport, and pyruvate transport, suggested that these metabolism pathways are associated with the development of tendinopathy that manifests as tissue disorganization and cell changes known as chondroid metaplasia (increase in cell numbers, cell rounding, and deposition of chondroid proteins). Taken together, this data suggests that monitoring of tendon cell metabolic changes may serve as a diagnostic to evaluate disease progression and help identify novel areas for intervention. Overall, the potential link between glucose metabolism and tendon disease is interesting since diabetes mellitus patients are at increased risk for developing tendinopathy.

VISITING SPEAKERS

continued



BILL BUGBEE, M.D.

“Osteochondral allografts”

Dr. Bill Bugbee received his M.D. from the University of California, San Diego, and his B.S. in biology at the University of California, Los Angeles, where he graduated magna cum laude. Dr. Bugbee completed his internship in surgery and residency in orthopaedic surgery at UCSD Medical Center. He completed his fellowship in adult reconstructive surgery at the Anderson Orthopaedic Research Institute in Alexandria, Va.

Prior to joining Scripps Clinic, Dr. Bugbee was the chief of arthritis surgery and joint reconstruction and the director of the UCSD Cartilage Transplantation Program. In his current position at Scripps Clinic, he is an attending orthopaedic surgeon in the Division of Orthopaedic Surgery, is director of the Cartilage Transplant Program, and is director of the Lower Extremity Reconstruction Fellowship program.

Dr. Bugbee has received numerous honors and awards. In 2015, he received the Kappa Delta Elizabeth Winston Lanier Award for research on optimizing the process and effectiveness of osteochondral allograft transplantation for cartilage repair. He has authored more than 110 papers and 39 book chapters. He has presented more than 170 talks at national and international meetings, focusing on allografting and lower extremity reconstruction. He has ongoing research projects in the field of allografting and cartilage repair.

Dr. Bugbee shared his pioneering role in bringing osteochondral allografts to the clinic to help human patients; he is considered by most to be the father of this technique. He is engaged in numerous projects with Drs. Wayne McIlwraith and Dave Frisbie to improve the technology to help more patients.

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NEW FACULTY, STUDENTS, AND STAFF

KELLY SANTANGELO, D.V.M., Ph.D., DACVP



Following completion of a doctoral degree in veterinary medicine from Cornell University, Dr. Kelly Santangelo completed an equine surgery and anesthesia fellowship at a top referral hospital in Ohio. Her next educational phase focused her efforts on achieving a Ph.D. in comparative and

translational medicine, in combination with a residency in clinical pathology, at The Ohio State University. This work predominantly revolved around preclinical, clinical, and industry-sponsored studies that focused on musculoskeletal disorders, including bone fracture healing, tendinopathies, and arthropathies. Dr. Santangelo was then awarded an NIH F32 NRSA Postdoctoral Fellowship to investigate the role of interleukin-1 β mediated signaling in a guinea pig model of spontaneous osteoarthritis. She subsequently received a competitive GlaxoSmithKline and ACVP/STP Coalition Award to fund a veterinary pathology residency combined with pharmaceutical industry exposure. This latter experience focused on all aspects of proprietary high throughput drug development and screening, and has molded her scientific perspective to include industry-inspired research and business tactics. Hired as an assistant professor at Colorado State University in July 2013, she currently has a predominantly research appointment while actively maintaining high clinical service and teaching commitments. Dr. Santangelo joined the faculty of the Orthopaedic Research Center in 2017.

Dr. Santangelo's long-term professional goal is to systematically characterize molecular factors that contribute to the generation and progression of OA and identify novel treatment options. Her research utilizes a multidisciplinary approach to medical science, which integrates molecular techniques, high-resolution imaging, and computer-aided gait analyses to provide a comprehensive depiction of OA in multiple species. Dr. Santangelo is also co-director of

the Experimental Pathology Facility at CSU, an emerging core focused on providing anatomic and clinical pathology support to local and national researchers.

Honors include: NIH F32 NRSA, 2006; PEO International Foundation – Scholar Award for Women, 2009; GlaxoSmithKline/ACVP/STP Coalition Training Award for Residency in Veterinary Pathology, 2009; AVMA and Merck-Merial – Young Investigator Award, 2009; ACVP Pathology Resident of the Year, 2011; OARS World Congress – Top Abstract and Plenary Talk, 2017; Boettcher Foundation – Webb-Waring Biomedical Research Award, 2017.

KATIE SEABAUGH, D.V.M., M.S., DACVS, AND DACVSMR



Dr. Katie Seabaugh joined the ORC as the staff veterinarian and part of the CSU Equine Sports Medicine and Rehabilitation team in October 2016. She obtained her doctorate in veterinary medicine from Washington State University. The following year she completed an internship at a specialty

equine referral practice in Oakdale, Calif. Following the path she set for herself, she obtained and completed a large-animal surgical residency at Colorado State University and subsequent board certification in the American College of Veterinary Surgeons. While at Colorado State University, she gained valuable insight and experience with many treatment and rehabilitation options for a gamut of equine injuries, including regenerative therapies. In 2013, she took a faculty position at the University of Georgia and became board certified in 2015 in the American College of Veterinary Sports Medicine and Rehabilitation.

NEW FACULTY, STUDENTS, AND STAFF

continued

KATIE ELLIS, D.V.M.



Dr. Katie Ellis joined the Equine Sports Medicine and Rehabilitation Service's residency program in July 2017, following completion of a one-year equine diagnostic imaging internship, also at CSU. She graduated from the University of Georgia in 2009 followed by a large-

animal medicine and surgery internship, also at UGA. She then worked in an equine ambulatory practice around Jacksonville, Fla., for five years before deciding to pursue equine sports medicine. She completed an equine surgery and sports medicine internship at the University of Florida before starting at Colorado State University.

KURT SELBERG, D.V.M., DACVR



Kurt Selberg is a north Idaho native, where his family owned a quarter horse ranch. After completing his doctorate in veterinary medicine from Washington State University, he completed an equine sports medicine internship at Virginia Equine Imaging

in Middleburg, Va. He received his training in diagnostic imaging from Colorado State University and is a Diplomate of the American College of Veterinary Radiologists. Following his residency, he completed a fellowship in advanced imaging with training from Colorado State University and from musculoskeletal radiologists in Fort Collins, Colo. He was an assistant professor of equine diagnostic imaging at the University of Georgia for four years before returning to an equine diagnostic imaging position at Colorado State University in September 2016. His area of interest is the equine athlete and musculoskeletal diagnostic imaging. His current work, in collaboration with other talented faculty at

CSU, involves limited-view CT, bone marrow lesion detection, and imaging correlation with lameness. Dr. Selberg was recently selected as the diagnostic imaging consultant for the World Equestrian Games in Tryon, N.C., in the fall of 2018. He is also an FEI-treating veterinarian. Aside from diagnostic imaging, he enjoys telemark skiing, jiu-jitsu, fishing, and spending time with good friends and family, his lovely wife, Katie, 2 children, and a yellow dog.

KATIE SIKES (TRELLA), Ph.D.



Dr. Katie Sikes received her Bachelor of Science in biomedical engineering from Rose-Hulman Institute of Technology in 2011 and her Doctor of Philosophy in bioengineering from the University of Illinois at Chicago in 2016. As a postdoctoral fellow with

Dr. Dave Frisbie at the Orthopaedic Research Center, Dr. Sikes utilizes a multidisciplinary approach to study animal models of musculoskeletal disease, primarily a murine model of tendinopathy and rat model of myotendinous injury, where molecular analyses can be correlated with structural and functional properties to assess full-scale disease progression and healing.

COLTON MCINTURFF, D.V.M.



Dr. Colton McInturff graduated from the University of Tennessee's College of Veterinary Medicine in May 2017, then began a one-year equine diagnostic imaging internship. McInturff is expected to begin a residency in sports medicine

and rehabilitation, which is being sponsored by Equine Sports Medicine LLC (Pilot Point, Texas). The internship is supervised by Drs. Myra Barrett and Kurt Selberg.

VERONIQUE ST-MAURICE



Veronique St-Maurice joined the Equine Sports Medicine and Rehab team in July 2017 as Dr. Melissa King’s technician and rehab manager. Previously, St-Maurice lived in Pennsylvania, managing and training out of a large barn specializing in event horses, retraining off-the-track Thoroughbreds, and running a small breeding program. She wanted a change from the East Coast and made the move to Colorado in 2015. In her first year of living here, St-Maurice worked as a small-animal veterinary technician and rode part time. Joining the CSU team has allowed her to combine both her love of horses and veterinary medicine.



IN THE NEWS

DR. DAVID FRISBIE INSTALLED AS 2018 VICE PRESIDENT OF THE AMERICAN ASSOCIATION OF EQUINE PRACTITIONERS



Dr. David Frisbie, whose leadership has shaped AAEP’s continuing education programs and resulted in his being honored with the 2011 AAEP President’s Award, was installed as the 2018 vice president during the AAEP’s 63rd Annual Convention. He will assume the role of AAEP president in 2020.

Dr. Frisbie is an authority in musculoskeletal diagnosis and treatment and has evaluated various therapeutics and biologics, such as stem cells. He is a professor at Colorado State University, director of research at CSU’s Orthopaedic Research Center, and interim director of operations at the University’s C. Wayne McIlwraith Translational Medicine Institute. He also is a partner in Equine Sports Medicine LLC, of Pilot Point, Texas, and the managing partner of eCORE North Texas LLC.

KELLY SANTANGELO, FIRST VETERINARIAN TO RECEIVE THE WEBB-WARING AWARD

ORC faculty member and biomedical researcher, Kelly Santangelo, received a Webb-Waring Biomedical Research Award from the Boettcher Foundation. Santangelo joined seven other top Colorado researchers in the 2017 class of Boettcher Investigators, as they are called.

Dr. Santangelo, the first veterinarian to ever receive the Webb-Waring award, will



Holly Stewart (left) attended ACVS and is pictured standing in front of her poster, “Characterization and comparison of two high-field MRI systems in an ex vivo model of equine bone marrow lesions.”

IN THE NEWS

continued



explore “Prevention and therapy of post-traumatic osteoarthritis.” Her research will investigate how, after traumatic injury, the interaction between Toll-like receptors — proteins that play a key role in the immune system — and damage-associated molecular patterns contribute to the development and progression of post-traumatic osteoarthritis.

Dr. Santangelo’s research will explore injury-induced osteoarthritis, which affects military personnel and civilians. She plans to examine medications that are already approved by the U.S. Food and Drug Administration, though not necessarily for osteoarthritis. She will also explore human synovial fluid, which is found in people’s joints, to characterize what is in the fluid that is inviting inflammation.

“It would be great if we could prevent this type of osteoarthritis from occurring,” she said. “If we could lessen the pain, it would add a tremendous amount to a person’s quality of life. It never ceases to amaze me how much we take our mobility for granted, until something happens with it.”

Dr. Santangelo will collaborate on the project with researchers at the University of Colorado Denver and Rush University Medical Center in Chicago. She said this award means a “tremendous amount” to her.

“Our team has the potential to make an impact, and I am thankful for the Boettcher Foundation and CSU for supporting this work,” she said.

Mary Guiden from CSU’s Department of Public Relations contributed to this article.

CSU ORC FACULTY MEMBER APPOINTED PRESIDENT OF THE AMERICAN COLLEGE OF VETERINARY SPORTS MEDICINE AND REHABILITATION

Dr. Kevin Haussler, an associate professor at the Orthopaedic Research Center, became president of the American College of Veterinary Sports Medicine and Rehabilitation in October 2017. Dr. Haussler was elected as a Charter Diplomate of the ACVSMR in 2010 (along with Dave Frisbie, Chris Kawcak, and Wayne McIlwraith) and served as the secretary/treasurer from 2009 to 2014 and co-chair of the ACVSMR Examination Committee and Equine Section chair from 2014 to 2017. He was elected vice president in 2015-2016, president-elect in 2016-2017, and is serving as president for 2017-2018.

The ACVSMR was accredited by the American Veterinary Medical Association as a veterinary specialty in 2009, and 27 Chartered Diplomates (canine and equine specialists) were elected in 2010. The ACVSMR was developed to meet the unique needs of athletic and working animals as well as all animals in need of rehabilitation. Rehabilitation (the term used for people is “physical therapy”) not only focuses on recovery after surgical procedures, but also on improving the quality of life in animals suffering from debilitating diseases such as arthritis or neurologic impairments.



Dr. Haussler has been at the Orthopaedic Research Center since 2005, and his research involves objective assessment of pain, spine-related disorders, and the initiation of chiropractic and physical therapy/rehabilitation research for the management of musculoskeletal injury. Congratulations, Dr. Haussler!

IN MEMORIAM

DR. JOSEPH FOERNER

The ORC lost a great friend when Dr. Joe Foerner passed away Nov. 7, 2016. Dr. Foerner and Dr. Wayne McIlwraith had been close friends for more than 40 years, and McIlwraith recognizes him as one of his critical mentors in the early years. Dr. Foerner mentored many equine surgeons and is recognized particularly for his numerous original contributions to both arthroscopic surgery as well as abdominal surgery in the horse. Dr. Foerner graduated from the University of Illinois with his D.V.M. in 1965, followed by an internship in equine surgery at the University of Pennsylvania. He then became a partner at Illinois Equine Hospital and was the first board certified equine surgeon in private equine practice. In addition to being a Diplomate of the American College of Veterinary Surgeons, he served as president, chairman of the board, and regent. He taught in a number of the early advanced arthroscopic surgery courses and contributed to the first two editions of Dr. McIlwraith's book, *Diagnostic and surgical arthroscopy in the horse*. In addition, he remained keenly interested in the progress of our research at the ORC and always supplemented that information to his many innovations in technique and practice. He lectured and gave labs many times to veterinarians and was awarded the AVMA Practitioner Award in 1997. He is survived by his wife, Dr. Kim Peterson, and daughter, Josephine and son, Marshall Foerner and it is our honor that the ORC was named the place to donate memorial gifts after his passing. He was a legend and equine surgeon to so many people and is greatly missed.

BUD ADAMS

Bud Adams, who passed away in August 2016, was a great supporter of equine programs at CSU. His name is memorialized in the Bud and Jo Adams Equine Reproduction Laboratory as well as the Adams Atkinson Arena that was built when Dr. Wayne McIlwraith was the director of equine sciences and was made possible by the generosity of Bud Adams, together with the late Ken Atkinson. After World War II, Adams returned to New Mexico and attended the University of New Mexico where he earned his master's in political science, married Louise Boyd, and became an educator and began raising and showing Arabian horses. He and his wife built up Adams Arabians and relocated to Scottsdale, where Adams Arabians became a premier ranch on the Scottsdale scene. Adams was president of the Arabian Horse Association of Arizona as well as the Arabian Horse Association of New Mexico. Adams's second wife, Jo became a strong supporter of CSU as well, and their most recent funding of the rebuilding of the Equine Reproduction Lab at CSU was testimony to their joint philanthropy, their love for CSU, and their long and close relationship with Dr. B.W. Pickett.

2017 SUPPORTERS

With grateful acknowledgment, we thank those who are so critical to the continued success of our program. More specifics on our donor contributions will be included in the 2017 Annual Report.

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If you have questions or need additional information, contact Paula Vanderlinden, Orthopaedic Research Center, at (970) 297-4165 or paula.vanderlinden@colostate.edu.