Orthopaedic Research Center

Arthros

Colorado State University

College of Veterinary Medicine and Biomedical Sciences
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WHAT'S INSIDE

Use of Stem Cells for Orthopaedic Conditions in the Horse

In recent years, enthusiasm for a new class of treatment modalities has grown exponentially in veterinary clinics. These treatments have been classified under the umbrella term of regenerative medicine, a general category that encompasses treatment modalities for the repair of damaged tissues that do not spontaneously heal. Examples of regenerative medicine strategies include tissue engineering, which is focused on the creation of an implant composed of cells, carrier scaffolds, and growth factors; or gene therapy, which seeks to create genetic modifications as a means of delivering therapeutic molecule for tissue regeneration.

These novel methods of repair have spurred a tremendous volume of research in both medical and basic science laboratories over the past 25 years. However, the need for indisputable evidence of safety and efficacy has limited the clinical application of these modalities to date. In the present environment, regenerative medicine applications have been limited to situations where traditional treatment modalities are, at best, minimally effective. Furthermore, the novel treatment must be of reasonable cost and simple in composition and application to minimize any risk associated with the new technique. Given that these conditions are met, the clinician must then carefully select test cases that are both frequently encountered in the clinic and that also offer the best chance for healing in order to establish the potential for more widespread application of the new therapy.

Dr. John Kisiday

At the Orthopaedic Research Center (ORC) at Colorado State University, we have been involved with regenerative medicine strategies for many years. In particular, we began studying the potential of stem cells for orthopaedic applications in 2003. This work started because of Dr. John Kisiday's expertise in stem cell culturing and its use in tissue regeneration using bone marrow-derived mesenchymal stem cells (MSCs). Our initial efforts centered on a tissue engineering approach for cartilage repair. At that time, it was well-known

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Letter from Dr. McIlwraith

We've had another good year both in productivity from the Orthopaedic Research Center and financial support of the program.

Particularly notable was a $3 million gift from Miss Abigail Kawananakoa to create a University Endowed Chair in Integrative Therapies and Rehabilitation. (See article on Page 7).

Mr. Herbert Allen has also contributed $250,000 to support our ongoing research, and another $200,000 has come from The Steadman-Hawkins Research Foundation to support research in the use of bone marrow-derived mesenchymal stem cells to augment cartilage healing with microfracture.

We also acquired two NIH Training Grants this year for Dr. Laurie Goodrich and Katrina Easton, respectively. Such support is appreciated in these trying financial times.

The Histopathology and Biomechanical Testing Lab has been completed. In addition, a new Gait Analysis Laboratory has been completed (this was funded by the dean of the College of Veterinary Medicine and Biomedical Sciences, the provost, and the vice president for Research and Technology at Colorado State University, as well as donated monies from the Orthopaedic Research Center). More recently, a canine gait lab has been placed in this center, thanks to the generosity of the Thaw Foundation.

We also have additions to our team. Dr. Dora Ferris joins us as a supervising veterinarian for the day-to-day horse care in the program, and Jeff Ullmer has assumed the position of barn manager.

None of this is possible without the great help of our faculty and staff as well as our student volunteers. Everyone has been very productive, and as always, I wish to express particular appreciation to our donors for supporting our work.

Best wishes,

Wayne McIlwraith
Director

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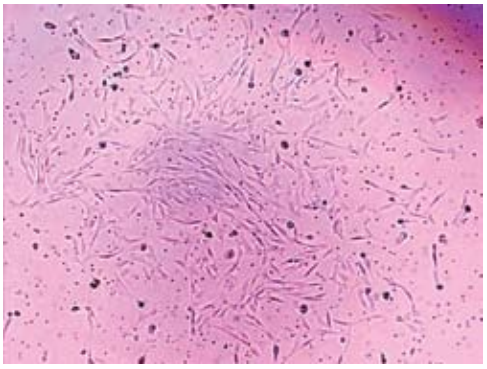
that MSCs possess a strong potential to undergo multilineage differentiation, making them a strong candidate for regenerative medicine strategies involving tissues such as cartilage, bone, meniscus, tendon, and ligament. Furthermore, the bone marrow from which MSCs are isolated is renewable and can be harvested using a minimally invasive, nonsurgical procedure. After verifying that adult equine MSCs are capable of differentiating into cartilage within our laboratory tissue engineering model, we elected to move forward with these cells within a National Institutes of Health-funded investigation into a cartilage resurfacing strategy using the equine models developed at the ORC.

During the exploration of this tissue engineering strategy, it was necessary to optimize our MSC isolation techniques in order to obtain the millions of cells per horse that was necessary to conduct laboratory studies. The principles of deriving stem cells from bone marrow are illustrated on Page 3. Briefly, small volumes (~10 ml) of bone marrow are drawn from the ilium into a heparin solution. The nucleated cells are extracted from the whole marrow and seeded into tissue culture flasks. Over time, colonies of MSCs form in the flasks. These colonies are then harvested and reseeded into additional flasks, where they proliferate until a suitable number of MSCs are obtained. The MSCs are then cryopreserved until they are ready for use. In 2005, we decided to use this capability for an additional regenerative medicine application in tendon, ligaments, and soft tissue structures in joints. At that time, preliminary reports suggested that the injection of MSCs into damaged joints, tendons, and ligaments could stimulate a significant repair response. After determining that MSC injections could be produced at a reasonable cost and anticipating minimal risk from the injections, we initiated our clinical study in joints that had experienced significant cartilage and meniscus damage, as well as tendons and ligaments with large core lesions. In addition to ORC veterinarians, three

off-campus equine centers were enlisted to participate in this survey. Over the next two years, approximately 50 joint, 50 tendon, and 50 ligament cases were treated. We are presently investigating long-term follow-up that will be critical for evaluating the lasting effect of these treatments, but to date, our preliminary observations have been favorable. For example, 15 joint cases revisited six to 18 months after MSC treatment showed that 10 horses had returned to work. Anecdotally, the results of the tendon and ligament injections have been positive, with multiple reports of neotissue growth within lesions and a return to function. Finally, we have been encouraged to find that those veterinarians who began implanting MSCs in 2005 continue to use this treatment on a regular basis.

Because of demand exceeding our expectations, we have developed a separate laboratory named Advanced Regenerative Therapies (ART) for our MSC processing. At ART, two cell biologists utilize the same bone marrow processing and MSC expansion techniques optimized at the ORC to offer these MSCs to veterinarians who are interested in using these treatments. With an additional 100 treatments processed to date, we continue to view these cases as research-oriented, with planned follow-up to hone in on efficacious applications of injected MSCs. Given our observations to date, we are excited about the potential to establish the role of MSCs for routine treatment of certain orthopaedic injuries.

Stem Cells: CSU (Bone Marrow)



Expand to 5-20 mil

Cryopreserve

Catastrophic Injuries

Eight Belles again brought the problem to public attention. What are we doing about it?

The tragic catastrophic injuries to Eight Belles after finishing third in the Kentucky Derby re-exposed the seriousness of catastrophic injury in the racing Thoroughbred. As often happens, there were various proclamations in the press as to the cause of her injury (including in the *Denver Post* the next day, stating that it was due to fragility associated with inbreeding to Native Dancer). A congressional hearing followed on June 19, 2008, entitled "Breeding, Drugs, and Breakdowns: The State of Thoroughbred Horseracing and the Welfare of the Thoroughbred Racehorse," at which Dr. McIlwraith was asked to testify.

It has been a critical part of our mission at the Gail Holmes Orthopaedic Research Center to do everything we can to decrease this problem. Below is a "Final Turn" column written by Dr. McIlwraith, published in the *The Blood Horse* on Sept. 6, 2008, and reprinted with permission.

Final Turn FUTURE OF INJURY PREVENTION *by C. Wayne McIlwraith, BVSc, Ph.D., DACVS*

I testified as part of the "Breeding, Drugs, and Breakdowns: The State of Thoroughbred Horseracing and the Welfare of the Thoroughbred Racehorse" congressional hearing on June 19, 2008. It was both disillusioning and enlightening. I naively thought that I was invited, along with three other veterinarians, to talk about all the issues influencing fatal injuries in racehorses. I expected some tough questions and was looking forward to getting the facts as we know them out in the open, including the use of medication from a veterinarian's perspective. However, the positive work taking place wasn't fully explored that day, and it is important that everyone with a stake in the racing industry understand the key research that is under way to significantly reduce the injury rate in racehorses.

A tremendous amount of study is being done by researchers on the factors that predispose a horse to injury. It is becoming clear that detecting the presence of existing damage to the horse's musculoskeletal structure through early recognition techniques is critical to fracture prevention. Our research group at Colorado State University, along with our collaborators, has demonstrated that the presence of "microdamage" in the bone can lead to the catastrophic fractures that we see in the fetlock joint (these include condylar and biaxial sesamoid fractures). Researchers at UC Davis have shown that stress fractures can be a precursor to catastrophic injury. It is well recognized that nuclear scintigraphy is effective in detecting these stress fractures, and early recognition has prevented numerous catastrophic injuries. The challenge is to identify the horse that shows no signs of lameness but has microdamage, which is essentially a fracture present in the earliest stages of development.

Getting horses routinely screened is the key to early detection. While CT scans and MRI are not practical for screening large groups of horses, the use of blood biomarkers and analysis offers the greatest potential for identifying at-risk horses. The principle behind biomarker testing is very straightforward: When cartilage and bone begin to break down early in the disease process, these products are released and can be measured by a laboratory test. An elevated test result indicates that the horse is potentially at risk for an injury. At that point, the horse can undergo a thorough diagnostic examination that involves nuclear scintigraphy or a CT scan.

In our most recent study funded by the Grayson-Jockey Club Research Foundation and done in racing Thoroughbreds in Southern California, we found that, with sequential blood samples, we could pick up changes in biomarkers six weeks before an injury occurred. Our accuracy rate in the study was approximately 70 percent, and we are striving to reach 100 percent accuracy. The future vision is that we could identify a horse at risk through monthly samples of blood biomarkers. The important result here is that the horse would be taken out of training, the microdamage could heal, and a catastrophic fracture would be prevented.

Reducing catastrophic injuries is the most important issue facing the racing industry, and we are hopeful that the biomarker test will soon be commercially available for use by the equine industry. We must protect the health of our equine athletes, and advances in veterinary research and technology are soon going to allow us to see a day when horses receive care and treatment before an injury occurs. Other factors such as racing surfaces and training regimens must be evaluated for their roles in catastrophic injury, and a screening test is no substitute for proper horse management. We also must examine other purported injury factors such as durability, two-year-old racing, and medication. But an easy-to-use test is a significant step toward an injury-free horse.

Those are the positive developments that didn't make the headlines from the congressional hearing. There is good reason to be very optimistic about efforts under way to protect the health and welfare of the horse. As a veterinarian, I am proud to be a part of these advances.

Dr. Wayne McIlwraith is professor of surgery and director of the Gail Holmes Equine Orthopaedic Research Center at Colorado State University and holds the Barbara Cox Anthony Endowed Chair in Orthopedics. He is a past president of the American Association of Equine Practitioners.

Endowed Chair in Musculoskeletal Imaging

On Feb. 28, 2008, Colorado State University announced the establishment of a college endowed chair in memory of longtime Equine Science supporters Kenneth and Virginia Atkinson. The Kenneth and Virginia Atkinson Chair in Musculoskeletal Imaging will reside at the Equine Orthopaedic Research Center and allows for the creation of a permanent position leading musculoskeletal imaging in general and the MRI Center in particular.

Ken Atkinson, who is also named on the Adams Atkinson Arena at the Equine Center, died in August 2004. His wife, Virginia, died in December 2005, and the couple had willed an endowment to the Orthopaedic Research Center. "The Atkinsons were outstanding supporters of Colorado State University and its pioneering equine science programs, and this endowment continues their legacy of commitment to advancing the science of equine medicine," said Larry Edward Penley, then-president of Colorado State University.

"This chair will allow the University to pursue research, develop medical solutions, and treat the world's finest equine athletes."

The $1.2 million gift from the Atkinson estate for the chair complements a previous donation of $500,000 given to the Equine Orthopaedic Research Center by the Atkinsons in 2003 to purchase an MRI. The MRI Center is currently under the leadership of Dr. Natasha Werpy, an assistant professor at the ORC.

Ken Atkinson outside the Orthopaedic Research Center

"Because of the contributions of Ken and Virginia, the equine MRI program at Colorado State is today recognized as the center of knowledge in the world within this area," said Dr. Wayne McIlwraith, director of the Equine Orthopaedic Research Center at Colorado State. "In addition, their contributions have previously helped build one of the finest equine sciences programs in the nation here at the University, as well as provide major support to our Equine Orthopaedic Research Center."

"The MRI imaging services and research at the Equine Orthopaedic Research Center continue to set the bar for equine radiology around the world," said Dr. Lance Perryman, dean of the College of Veterinary Medicine and Biomedical Sciences. "This chair will allow the University to pursue research, develop medical solutions, and treat the world's finest equine athletes. In addition, it further allows researchers to make discoveries in the field of orthopaedic medicine that may improve the quality of life for humans and other animals facing orthopaedic injuries." MRI, or magnetic resonance imaging, is the gold standard for identifying joint disease in humans and the best technique for noninvasive joint evaluation.

Atkinson was a former Horseman of the Year, elected by the Colorado Horse Council. His horses often were clients of the veterinary medicine teaching program at the University. During remarks at the dedication of the Adams-Atkinson arena in 1994, Ken Atkinson expressed his thoughts on donating to the University and making a contribution toward education.

"Colorado has been good to me," he said. "Besides being a wonderful place to live, I have prospered here. I wanted to find a way to put something back, but I wanted it to be a place where the results would benefit this fine state for many years to come.

"I believe the future of our nation depends on how well we educate and motivate our young people. At CSU, I see hundreds of bright young faces with clean, wholesome expressions looking forward with clear and honest eyes. They impress me as being the kinds of people I would feel comfortable entrusting with the future well-being of our country. What better way to make a contribution than to help these fine young people get a good start?"

MRI Systems Currently Available: What They Can Do for Equine Patients

The Relationship Between Image Quality and Diagnostic Accuracy

High-field MR imaging systems are defined as having a field strength of 1.0 tesla or greater. Low-field MR systems are defined as having a field strength of up to 0.3 T. There is a relationship between image quality and diagnostic accuracy. Does the improved image quality achieved with high-field systems translate into increased diagnostic accuracy, or does it just produce nicer looking images?

This has been a long and controversial debate in human medicine. Several papers concluded there is no statistically significant difference between the diagnostic accuracy of low-field and high-field MR systems in examining the human knee. Barret et al. focused on derangements of the human knee, such as meniscal or cruciate ligament tears, and found no significant difference in specificity or sensitivity for lesion diagnosis between low- and high-field systems. In this paper, many of the cruciate injuries were full thickness tears. However, one study compared high- and low-field images of human knee lesions that included full thickness articular cartilage defects, and of six defects detected with a high-field system, only one was detected with a low-field system. Currently, there is no publication that compares high- and low-field systems for identification of partial-thickness cartilage lesions in either people or horses.

A review of the literature and evaluation of images from patients examined with both systems demonstrate that the diagnostic accuracy of high- and low-field systems is dependent on the lesion size and type. High-field systems allow detection of small- and low-contrast lesions that cannot be identified with low-field systems. Certain lesions, such as articular cartilage defects, will have clinical significance in many cases and probably cannot be consistently and definitively identified with a low-field system. In other cases, the clinical significance of lesions identified only with a high-field system has not yet been determined. This process will be challenging because we are making the assumption that an identified MR lesion – providing it correlates with the history, clinical signs, and the postulated source of pain – is the source of the lameness. However, this may not always be the case. The same lesion may cause a different degree of lameness in different horses; there is clearly a large degree of individual variation. This makes categorization of lesions by MR appearance and degree of lameness, while necessary and helpful, not accurate if applied to every case.

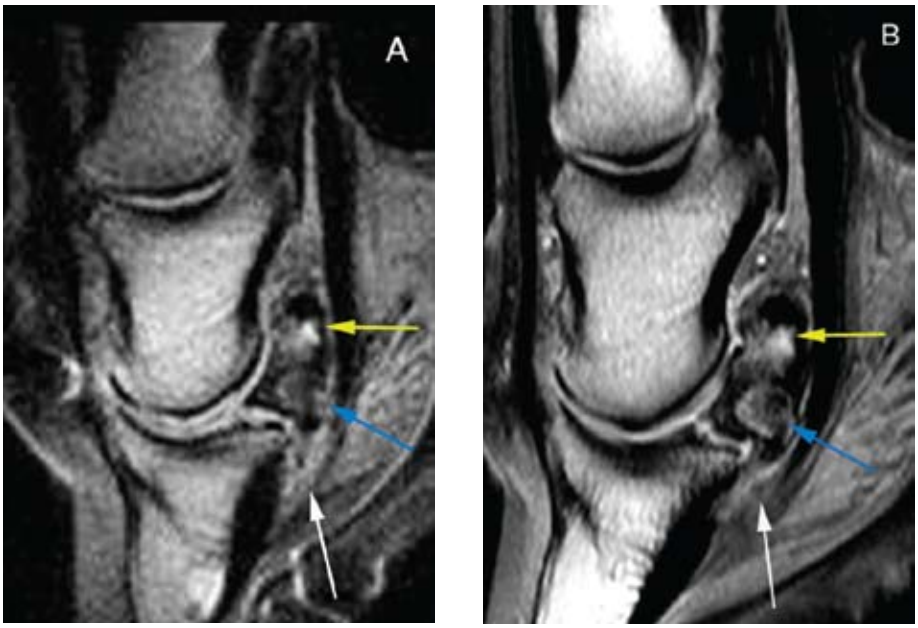


Figure 1. A sagittal proton density image produced using a low-field system (A). A sagittal proton density image produced using a high-field system (B). These images are from the same cadaver limb that was scanned on the same day in both systems. There is a large cystic lesion in the navicular bone, which is apparent on both images (blue arrows). There are enthesophytes on the proximal margin of the navicular bone at the attachment of the collateral sesamoidean ligament and the attachment of joint capsule of the DIP joint that are visible on both images but are more easily identified on the high-field image (yellow arrows). There are abnormalities in the deep digital flexor tendon and adhesions between the tendon and the impar ligament that can only be definitively identified on the high-field image (white arrows).

Further studies are needed to define the difference in the detectability of lesions on high-field versus low-field MR imaging systems and to determine the clinical significance of those lesions. Many injuries in the horse can be accurately diagnosed using both high-field and low-field MR systems. However, a high-field system is required to identify certain structures and lesions (Fig. 1).

For the complete text of the paper and more figures, visit our website at www.equineortho.colostate.edu/current.htm.

University Endowed Chair in Equine Integrative Therapies Established

When humans undergo orthopaedic surgery – whether to replace knees or hips, restore torn ligaments, or repair broken bones – follow-up rehabilitation and physical therapy are considered integral components of a successful treatment. Now, equine patients at Colorado State University can look forward to receiving the same rehabilitative benefits thanks to a $3 million gift that will help advance research in equine integrative therapies.

In November 2007, the College of Veterinary Medicine and Biomedical Sciences announced a gift to establish a third university chair in equine orthopaedics. A gift from Abigail K. Kawananakoa of Hawaii has created the Abigail K. Kawananakoa University Chair in Equine Musculoskeletal Integrative Therapies that will reside in the Orthopaedic Research Center.

"This gift supports important research at Colorado State that benefits both horses and humans," said Dr. Lance Perryman, dean of the College of Veterinary Medicine and Biomedical Sciences. "The Orthopaedic Research Center is known internationally for its innovative research that addresses orthopaedic injuries and osteoarthritis, including better methods of early diagnosis and new therapeutic targets. In addition, faculty and staff at the center apply that knowledge to equine athletes and share their discoveries with experts in human orthopaedic medicine."

The Orthopaedic Research Center at Colorado State is known worldwide for its research and clinical work to prevent joint problems in equine athletes, including racehorses and cutting horses, and for researching new ways to heal orthopaedic injuries including gene therapy and novel cartilage healing techniques, with some recently expanded work in human athletes.

"This chair completes our strategic plan in acquiring scientific support for rehabilitative manipulative therapies for musculoskeletal conditions, an area that is lacking in scientific-based evidence for the horse," said Dr. Wayne McIlwraith, director of the Orthopaedic Research Center and the Barbara Cox Anthony Chair in Equine Orthopaedic Research. "I have had a long and rewarding relationship with Abigail, and we are pleased and honored to house the chair in Miss Kawananakoa's name and look forward to the research discoveries and treatments to equine and human athletes the chair will support."

Kawananakoa has bred and raced multiple champion Quarter Horses. Her horses have won the two biggest Quarter Horse races in the United States: the All American Futurity with A Classic Dash and the Los Alamitos Million with Evening Snow. Both of these horses had arthroscopic surgery by Dr. McIlwraith.

Easton Awarded NIH Fellowship

Katrina Easton, a graduate student in the D.V.M./Ph.D. program in Biomedical Engineering and Orthopaedic Research at Colorado State University, received the Kirschstein-NRSA Predoctoral Fellowship under the sponsorship of Dr. Christopher Kawcak.

This proposal integrates engineering and life sciences in order to advance scientific understanding of the causes, treatment, and prevention of joint injury and osteoarthritis (OA), with the goal of enhancing medical care of these diseases. Musculoskeletal diseases, of which OA is the most common, are one of the leading causes of disability in people in the United States. Horses, like humans, are athletes and are subject to similar joint injuries and diseases, such as subchondral bone disease, fracture, and OA. This proposal used the horse as a model for human disease.

The specific aims of the proposal are 1) the development of a computer model of the equine fetlock joint using the finite elements (FE) method; 2) the correlation of specific joint parameters such as contact area to measures of bone quality; and 3) the application of this FE model to study the role of joint geometry in injury in the horse.

The hypothesis is essentially that there is a predisposition to catastrophic fractures in the fetlock joint (location of most catastrophic injuries in the racing Thoroughbred) associated with individual variation in joint shape. The proposal could also enhance understanding of these differences in joint geometry in the course of osteoarthritis (a relatively new area of investigations in humans).

EORC Research Program Receives NIH Grant

Dr. Laurie Goodrich has been awarded a grant from the National Institutes of Health to develop a gene therapy approach to help heal cartilage and prevent osteoarthritis in horses, potentially leading to scientific methods that also may help humans. The grant, which is $678,000 over five years, will investigate the success of treating joint injuries with a protein injected into injured joints within a virus-like agent called a viral vector.

"The lack of healing leads to cartilage degeneration and progression of osteoarthritis," said Dr. Goodrich, an assistant professor in the Department of Clinical Sciences and a member of the Orthopaedic Research Center faculty in the College of Veterinary Medicine and Biomedical Sciences at Colorado State. "This prevents many horses from returning to athletic performance."

Cartilage injuries in equine athletes are often career-ending. Cartilage heals on a limited basis because a specific kind of protein or growth factor, called insulin-like growth factor (IGF-I), is not as available in the joints and cartilage as it is in other areas of the body. IGF-I helps cartilage develop, and previous studies have shown that it promotes healing of injured cartilage. However, researchers have not been able to develop a way to maintain enough IGF-I in an injured joint to help it heal. Dr. Goodrich and a team of researchers hope that using a viral vector to deliver DNA that increases production of IGF-I, a protein, will increase healing in damaged joint tissues.

"While the study focuses on horses, the results may ultimately have the potential to help improve human cartilage health and reduce the osteoarthritis that often follows a cartilage injury," said Dr. Goodrich, who is principal researcher on the grant. "Horses have a very similar joint anatomy and biochemical and molecular makeup as humans, and joint injuries in horses often respond very similarly as humans to treatments. This is good news for horses and humans alike, as advances in joint research in horses will likely apply to humans."

Dr. Wayne McIlwraith, director of the Orthopaedic Research Center, and Dr. R. Jude Samulski, director of the Gene Therapy Center at the University of North Carolina, Chapel Hill, will co-mentor Dr. Goodrich's project. The project will involve collaborations with bioinformatics and gene research experts across Colorado State University, including Dr. Ken Reardon, a professor in the Department of Chemical and Biological Engineering; Dr. Hariharan Iyer, a professor in the Department of Statistics; Drs. Aravind Asokan, Jeff Beecham, and Tal Kafri from the University of North Carolina; Dr. Alan Nixon from Cornell University; and Drs. Chisa Hidaka and Chris Chen at the Hospital for Special Surgery in New York.

The Federal Drug Administration has recently recognized horse as an excellent representative study model for cartilage injury and osteoarthritis in people.

New Personnel

Dora Jean Ferris, D.V.M.

Dora joined the ORC in July 2008 as attending veterinarian responsible for the clinical management of research horses, overseeing treadmill training of the horses, assisting with clinical cases, and aiding research associates. She received her D.V.M. from Washington State University's College of Veterinary Medicine in 2007. Last year, she completed an internship focusing on equine lameness and surgery at Oakridge Equine Hospital in Edmond, Okla. Her veterinary interests center on equine lameness and sports medicine, rehabilitation, and complementary therapies.

Dora moved to Fort Collins in June 2008 with her husband, Ryan Ferris, D.V.M., who is completing a residency in equine theriogenology (reproduction) at the Colorado State University Equine Reproduction Laboratory. In her free time, Dora enjoys horseback riding, specifically dressage, and artistic pursuits such as leatherwork, sculpture, and painting. She and Ryan are looking forward to taking advantage of the many outdoor activities available in Colorado and expanding their skills in mountain biking and snowboarding.

Jeff Ullmer, B.A.

Jeff earned a B.A. in management from the University of Kentucky in 2003 and spent the next four years in the Army. He served as a Scout Platoon Leader and conducted surveillance and reconnaissance of the Iraq/Syrian border. In his last year in the military, Jeff commanded the Fort Carson Mounted Color Guard, an equine drill unit that travels the country promoting the goodwill of the Army. Jeff joined the ORC in August 2007 as the barn manager and research animal care technician.

Loss of Advisory Board Member, Alec Wildenstein

Leading international racehorse owner and breeder and Advisory Board member, Alec Wildenstein, died on Feb. 18, 2008.

"I have known Alec for more than 20 years, both as a consultant to their extensive Thoroughbred racing operation, as well as a friend," said Dr. Wayne McIlwraith. "He taught me a lot about racing in Europe and was very supportive of the research we did on horses in conformation factors that influence lameness, racing soundness, and conformation of the growing Thoroughbred. This work was the basis for Tina Anderson's Ph.D. project, which was the first objective assessment of the significance of the changes in conformation with growth as well as the significance of conformation in Thoroughbred racing soundness."

The relationship with Alec started with his father, Daniel, who asked Dr. McIlwraith to perform surgery on a horse in France, and then blossomed into consulting and management of foals, yearlings, and horses in training for the maximum welfare. Alec was the fourth generation of a renowned family of art dealers and had been involved in breeding and racing since his youth. He took over management of the stable upon the death of his father. They bred and owned some of the great horse runners of Europe including Allez France, Sagace, Aquarelliste, and Peintre Celebre. The latter claimed the family's first Prix du Jockey club and then won the Prix de l'Arc du Triomphe. Alec was involved in the breeding of many of their horses, and Daniel credited Alec with selecting the mating that produced

Peintre Celebre. His 2002-2005, racing highlights included Bright Sky winning the Prix de Diane (French Oaks) and the Prix de L'Opera, Aquarelliste winning the Prix Ganay, Westerner amassing several Group 1 wins, and Vallee Enchantee winning the Group 1 Hong Kong Vase.

The horse was always Alec's first priority, and he would stop at nothing to provide the best treatment for the horse's welfare. He was visionary and a great horseman and will be missed.

Advisory Board Member Spotlight: Martin J. Wygod

Martin J. "Marty" Wygod joined our advisory board last year. He is well-known as a Thoroughbred racehorse owner and breeder.

Upon graduating from New York University, Marty formed his own brokerage firm. At the time, he was the youngest manager partner of a New York Stock Exchange firm. After his sale of the firm for $10 million in 1969, Marty's focus turned to merchant banking for the next decade. In the late 1970s, Marty's first foray in the health care industry took place with the purchase of Glasrock Medical Services. He proceeded to revolutionize the cost and the delivery service of prescription drugs to the patient through his public company, Medco Containment Services. In 1993, Medco was purchased by Merck & Co. for $6.5 billion. Currently, Marty serves as chairman and CEO of WebMD, a leading provider of health information services to consumers, physicians, health care providers, employers, and health plans.

At the age of 15, Marty was walking hots at Aqueduct and Belmont race tracks. In the 1960s, he was given two racehorses by Fletcher Jones, a business friend and Thoroughbred owner. Both horses won in New York, which launched a 40-year career of racing and breeding horses for Marty. V.J. (Lefty) Nickerson trained Marty's horses, including Pirate's Bounty, for more than 30 years. Training for him now are Clifford Sise, John Shirreffs, and Dan Hendricks in California and Bill Mott in New York.

In 1976, River Edge Farm was built in Buellton, Calif., by Marty and Russell Drake, his farm manager. The first stallions to stand at River Edge were Bold Hitter and Pass the Glass. Pirate's Bounty stood at stud, upon his retirement from racing, and was to become the foundation of a successful breeding operation in California.

Marty, along with his wife, Pam, has been recognized as California's leading breeder by earnings in 2006 and 2007. In addition to breeding their mares to the three stallions standing at River Edge – Bertrando, Benchmark, and Tribal Rule – the Wygods also breed a large number of mares to Kentucky stallions, including their two stallions, After Market, a multiple Grade 1 stakes winner standing at Lane's End, and Yankee Gentleman, who stands at Airdrie Stud.

The list of racehorses campaigned by Marty include Sweet Catomine, the 2-year-old champion filly of 2004; Idiot Proof, stakes placed in both the 2007 Breeders Cup Sprint and the 2008 Dubai Golden Shaheen; and Tranquility Lake, After Market, Exotic Wood, Twice the Vice, Key Phrase, Proposed, and Silent Sighs.

In addition to racing and breeding, Marty serves on the board of directors of the Del Mar Thoroughbred Club, The Jockey Club, and TOBA.

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Lester Pedicord
Robert Shideler, D.V.M.
Traub-Brittan Family Foundation
United Way of Kitsap County
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McIlwraith-Peterson Project Wins Elastikon Award

The second annual Elastikon Equine Research Award, funded through a grant made by Johnson & Johnson Consumer Products Company to Grayson-Jockey Club Research Foundation, has been awarded to Dr. Wayne McIlwraith of Colorado State University and Dr. Mick Peterson of the University of Maine for their research designed to enhance the safety of racetracks for horses.

The project uses a drop hammer, with a simulated hoof, along with ground-penetrating radar, to analyze racing surfaces. Researchers agree that uniformity of a racetrack surface is a key component to keeping horses sound, and the McIlwraith and Peterson project will assist track superintendents in achieving that goal.

The project will address dirt tracks as well as synthetic surfaces.

The research project will create a protocol for track maintenance personnel to establish baseline information and maintain consistency on their racetracks. For synthetic surfaces, the research will include data on wax content and melt point.

"Elastikon is pleased to be able to support research that has a great potential to reduce injuries to racehorses," said Jack Weakley, director of the Sports Medicine Group of Johnson & Johnson's Consumer Products Company. "When Grayson-Jockey Club told us this project had been highly evaluated and recommended by its board and its Research Advisory Committee, we felt strongly that it was an excellent project for us to join in supporting. The safety of the competitors is inherent in Elastikon's very role in the industry, as is true of Grayson-Jockey Club Research Foundation's."

The $43,000 track evaluation project is one of two dozen research projects currently being funded by Grayson-Jockey Club Research Foundation for $1.2 million. The foundation, traditionally the leading source of private funding for scientific research specifically to benefit horses, has provided $15.5 million to fund some 240 projects at three dozen universities over the past 25 years.

Track Testing Device measures both impact and shear properties of the racetrack.

Orthopaedic Research Center

Arthros

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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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Research Projects Focus on Equine Rehabilitation

The Orthopaedic Research Center (ORC) has initiated two major research projects to provide objective assessment of the value of rehabilitation protocols after injury and, more particularly, after surgery.

The first project is in partnership with Pegasus Training Center in Redmond, Wash., and is being let by Drs. Wayne McIlwraith and Kevin Haussler with Dr. Mark Dedomenico. Dr. Dedomenico developed this facility, which is situated on a 100 acres just outside Seattle and has been developed with no expense spared to offer horses every amenity needed to assure a safe and speedy return to a successful athletic career. The project at Pegasus will involve taking 24 horses that have chip fragments in their lower carpal joints, with Dr. McIlwraith performing arthroscopic surgery on them, and then placing half the horses (randomly selected) into a rehabilitation program involving hyperbaric oxygen therapy, swimming, and underwater treadmilling. The other 12 horses will go through a "normal" protocol of hand-walking. At 60 days, all horses will enter a training program overseen by Mike Puhich, a successful West Coast trainer now working at Pegasus. Puhich will work the horse on the Pegasus' five-eighth-mile Polytrack®. Positive outcome parameters that may become evident include improved clinical signs, improved radiographic changes, improvement in a series of proprioceptive tests designed by Dr. Haussler, and earlier return to fast work when the horses go back into training. If this rehabilitation protocol proves successful, further clinical studies will be done to delineate relative values of each of the rehabilitation techniques.

The second project will be a controlled project with our osteochondral chip fragment model of osteoarthritis evaluating the value of underwater treadmilling to improve symptoms. This is Dr. Melissa King's Ph.D. project and will be conducted at Colorado State under the supervision of Drs. Haussler, Christopher Kawcak, McIlwraith, and Raoul Reiser and is funded by private donations. Half the horses will receive an underwater treadmilling protocol while the other half of the horses will not. In this fashion, evaluation of the value of underwater treadmilling will be obtained.

A horse undergoes underwater treadmill therapy (Aquasizer) at the Pegasus Rehabilitation Center.

I would like to support the work of the Equine Orthopaedic Research Center.

There are answers … and you can help us find them. With your help, we can find solutions to arthritis and joint injuries in horses and humans. Please donate to our program and consider us as a beneficiary in your estate plan. The Development Office staff members would be happy to assist you in selecting the giving option that best suits your financial and philanthropic goals. Call (970) 297-4165 or visit our website at www.csuequineortho.com for more information.

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

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