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Equine Osteoarthritis: Three Studies Show Promise

Stem cells studied as a treatment for osteoarthritis

Stem cells are receiving a great deal of scientific attention as well as coverage in the lay press. One of the many reasons for the attention stems from these cells having the potential to regenerate tissues without the production of scar tissue that is generally associated with healing processes. Drs. Frisbie and Kisiday have been heading up a multi-center clinical trial to assess how adult bone marrow derived stems cells can help horses with orthopaedic disease. This research began with a comparison of stem cells derived from either fat or bone marrow. The preliminary research suggests that bone marrow derived cells are more suited for use in damaged joints, which is why the Equine Orthopaedic Research Center is pursuing bone marrow derived cells in their clinical cases.

The current multi-center trial is still underway, but results of the first 15 horses are promising. In collaboration with Oakridge Equine Hospital (Dr. Hague), Washington State University (Dr. Schneider), and Texas A&M (Dr. Watkins), the team at Colorado State has been treating horses that they felt would have little hope of recovery with conventional therapy. These first 15 horses were all treated at least 6 months prior to follow-up, with the first case now out 18 months from treatment. Conditions treated included subchondral bone cysts, cartilage damage and/or loss, and torn menisci. In horses that became sound, the average days post treatment with stem



cells before they became sound was 78 days, with a range from 30-240 days. There were 10 of 15 (67%) horses that became sound and returned to their previous level of work in the discipline for which they were used prior to treatment. Given the fact that all horses in the treatment group had a poor prognosis prior to treatment, the group feels MSC therapy has yielded favorable results. To date the group has treated 40 joint related cases and hopefully will have continued success. The next step is to acquire funding to compare fat derived cells (the only source commercially available to date) to the bone derived cells used in the current study, in a controlled clinical case study.

continued on page 2

Letter from Dr. McIlwraith

We've had another excellent year both in productivity from the Orthopedic Research Center and financial support of the program. We also had a face-to-face meeting of our Advisory Board this year, which was very helpful in reporting and advising on our direction for the future.

Major gifts received in the last year included \$100,000 from the Stavros Niarchos Foundation. This gift will support the acquisition of histology equipment to go in a new lab dedicated for histopathology and Dr. Kisiday's testing that is currently being renovated. We also received \$50,000 each from John Andreini and Dr. Mark Dedomenico, and \$100,000 from Herbert Allen and Gail Holmes

Allen for continued support of Dr. Haussler's work. Most recently, a \$1 million bequest from Kenneth and Virginia Atkinson will initiate a Chair in Equine Musculoskeletal Imaging.

We have had a number of additions to our team. Paula Vanderlinden joins us as program coordinator, Dr. Earl Carlson joins us to supervise day-to-day horse care in our program, Jodi Callison comes as an equine clinical technician, Lynsey Bosch will coordinate our scientific paper submissions, and Susan James has joined us as a histology research associate.

Our collaboration with Bio-Engineering continues to strengthen with the acquisition of Dr. Christian Puttlitz and the numerous graduate students that he and Susan James supervise. We have a number of new graduate students who have joined us in the last year including Dr. Melissa King, Myra Barrett Frisbie, and Carrie Adrian, MSPT.

None of this work 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

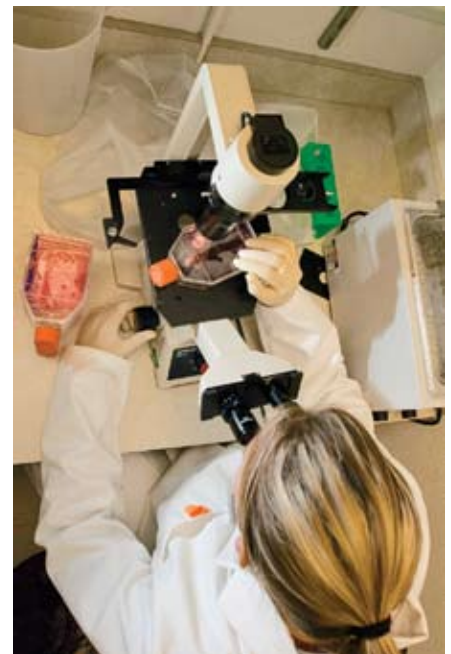


From this work it would become clearer if researchers indeed need to continue to use the more labor intensive bone derived cells.

Investigation of gene regulation cell by cell in equine osteoarthritis

Osteoarthritis remains a common and debilitating disease in humans, horses and other mammalian species, despite advances in diagnosis and treatment. Hyaline cartilage is considered to play a central role in the pathophysiology of osteoarthritis. The investigation of differences in gene expression in cells from osteoarthritic and normal cartilage is expected to yield genes that may play a role in the pathophysiology of osteoarthritis, representing possible new targets for the treatment of the disease. Tissue heterogenetically (differences between areas of a tissue) have thwarted exact definition of processes analyzed whole piece of tissue.

The goals of this investigation, which was the basis of Dr. Katja Düsterdieck's PhD, were to develop the techniques to isolate RNA from individual cells of various cartilage layers, a feat not accomplished before in articular cartilage. The second step was to determine what genes are differentially



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expressed in osteoarthritic versus normal articular cartilage from different depths within the cartilage.

Laser capture microdissection was used to isolate the cartilage cells, called chondrocytes. Next the samples underwent an extraction procedure followed by linear amplification of the mRNA, which increases the concentration of the mRNA in such a fashion it is readily detectable. These procedures allowed the researchers to obtain enough material to be analyzed on an equine gene chip. In collaboration with Ohio State University, the researchers were able to screen over 3,000 gene sequences using this unique equine gene chip.

Once the method of producing samples for the gene chip analysis was validated, tissue from adult horses with carpal osteoarthritis was assessed. 154 genes were found to be differentially expressed based on depth of the chondrocytes in the articular cartilage. The gene expression pattern of chondrocytes from the superficial layer reflected support of cell proliferation, suppression of apoptosis (cell death) and up-regulation of several genes involved in cell-matrix interactions or inflammatory processes. In contrast, the gene expression pattern of chondrocytes from the deeper layers were dominated by genes supporting the synthesis of proteins and proteoglycans, suggesting a higher matrix synthetic activity in these chondrocytes compared to those from the tangential layer.

Seventeen genes were found to be differentially expressed between osteoarthritic and normal cartilage (fold change > 1.5). Similar to the comparisons between cartilage layers, different expression patterns were found for osteoarthritic and control cartilage. The expression pattern for osteoarthritic cartilage was similar for the 2 cartilage layers, but changes in expression were more pronounced in the deeper compared to the superficial layer. The gene expression pattern in osteoarthritic chondrocytes indicated the activation of the pro-inflammatory, catabolic

NF- κ B pathway. It further suggested an increased response to stress, but decreased ability to resist cell death, as well as down-regulation of genes involved in proteoglycan synthesis and energy production compared to control cartilage.

This study was the first to determine gene expression patterns between 2 different layers of osteoarthritic and control articular cartilage. The present results improve our knowledge of spatial dependence of chondrocyte metabolism and its alterations under the influence of osteoarthritis. They provide the basis for future research into the pathophysiology of osteoarthritis and to identify new therapeutic targets for the treatment of this debilitating disease. These research efforts are on-going with support from Dr. Düsterdieck and under the guidance of Dr. David Frisbie.

Critical evaluation of Surpass[®] cream for the treatment of equine osteoarthritis

Dr. Frisbie, in collaboration with Drs. Kawcak, Werpy and McIlwraith, have completed a double blinded placebo controlled study on the beneficial effects of topical diclofenac liposomal cream (Surpass[®]) on equine osteoarthritis. Despite the well known detrimental side effects which can occur following prolonged systemic use, non-steroidal anti-inflammatory drugs (NSAID's) remain one of the front line treatments for osteoarthritis. The Food and Drug Administration has recently approved a novel formulation of 1% diclofenac liposomal cream (Surpass[®]) for use on horses. This formulation provides local absorption without achieving systemic blood levels, thus potentially obviating the negative side effects associated with systemic NSAID's. While a previous double blinded control clinical study was conducted using this formulation, the researchers only looked at improvement in symptoms or pain and not if joint health was preserved.

The purpose of the current study was to evaluate the symptom (pain) and disease (joint health) modifying effects of Surpass[®] compared to both placebo and positive control (oral "bute").

Twenty four horses with knee arthritis were followed. Horses were treated with placebo (application of a moisturizing cream was only performed prior to clinical examination to blind the evaluators of treatment assignments), 7.2g of 1% diclofenac liposomal cream (Surpass[®]) topically (twice daily) over the OA joint or 2g phenylbutazone orally (once a day) throughout the study. All horses completed the study and no adverse events were recorded. The percent change in lameness score indicated a significantly better response with Surpass[®] treatment when compared to phenylbutazone. Similar results were noted with the degree of damage measured using magnetic resonance (MR). Articular cartilage demonstrated a significantly ($p=0.01$) better glycosaminoglycan content (a vital component of articular cartilage) in the Surpass[®]. There was also a trend ($p=0.06$) for Surpass[®] to decrease the histologic progression of osteoarthritis when compared to placebo treatment.

The results of this study indicate that Surpass[®] cream applied to a joint with OA provides a significantly better outcome than a similar joint treated with systemic phenylbutazone. Furthermore, modest improvements in horses treated with Surpass[®] compared to placebo were seen in almost all parameters. Significant symptom modifying effects have been previously reported and were confirmed in this study. Interestingly, phenylbutazone was associated with negative effects and had less symptom modifying effects than expected. Treatment with Surpass showed improved disease modifying effects (joint health) when compared to placebo and support an improved response from the use of Surpass for solitary joint osteoarthritis.

Wireless Technology Used to Track Horse Movement

Researchers in the equine orthopaedic research center are now collaborating with a private company to develop wireless technology for tracking limb movement in horses.

In a collaborative effort with Equusys Inc., Drs. Kawcak, McIlwraith, and Reiser are working towards developing a system that can monitor how horses use their limbs during exercise. In particular, the technology, which uses accelerometers, gyroscopes, and magnetometers in a compact wireless device, can be attached to the horse's limbs and used at a high speed to monitor how the limbs are used and measure the stresses that they undergo.

This breakthrough technology has the potential to be used to monitor the limbs of racehorses and potentially prevent catastrophic injury. In addition, the goal of this collaboration is to create a user-friendly software interface with veterinarians so that it can be used as part of the routine lameness examination in clinics. The collaborative group is at this time testing the system against objective measures of lameness and should have those data in the next year.



Figure 1: Horse showing sensors attached to the feet and the pole.



Figure 2: Close up image of a sensor.

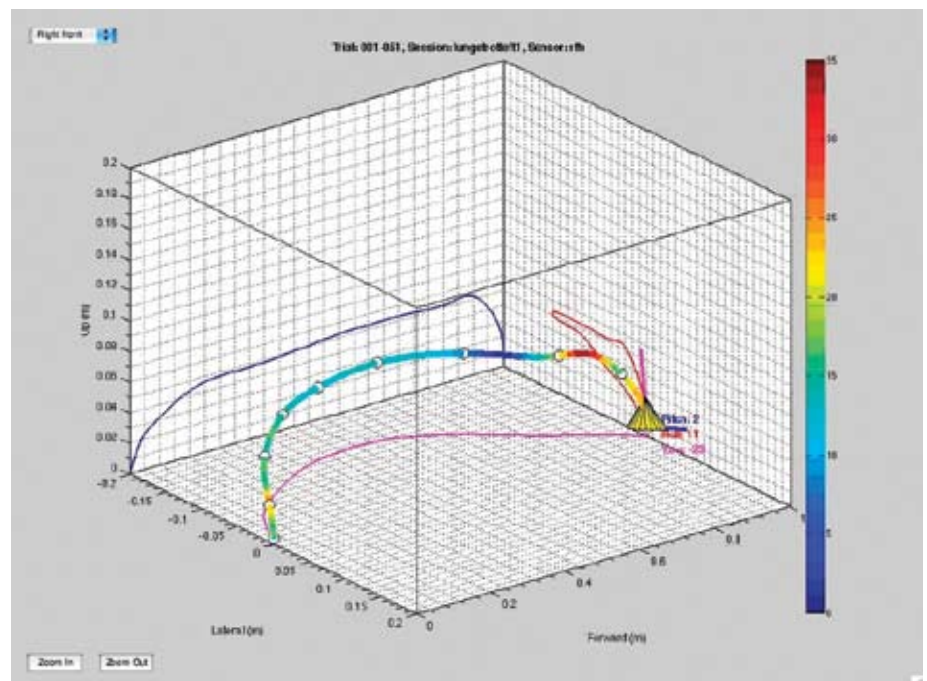


Figure 3: Output showing the hoof flight through a typical stride.

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Evaluation of Back Pain in Horses and the Effects of Spinal Manipulation

Dr. Kevin Haussler and colleagues have recently completed a number of studies looking at detections of pain in the vertebral column and how it can be treated with manipulation. An objective measure of neck, back, and croup pain is needed in horses with musculoskeletal injuries, vague upper limb lameness, or poor performance. One study was conducted in normal horses to establish pain perception levels (i.e., mechanical nociceptive thresholds) within the neck, back, and pelvis and to evaluate the effects of ridden exercise on pain perception. Thirty-six adult horses (10 unriden; 26 actively ridden) were used to assess pain perception levels with pressure algometry at 62 midline and bilaterally landmarks along the neck, back, and pelvis. Pressure was applied at a uniform rate of application until a local avoidance reaction (i.e., skin

An objective measure of neck, back and croup pain is needed in horses with musculoskeletal injuries, vague upper limb lameness or poor performance.

twitch) was noted. The pain perception levels were repeatable and increased in a cranial-to-caudal gradient within the vertebral column. The regional pain pressure levels in the cervical region were 9 kg/cm²; thoracic region were 12 kg/cm²; lumbar region were 13 kg/cm²; and pelvic landmarks were 16 kg/cm². Higher pain threshold levels were measured in horses that were ridden and actively exercised, compared to unriden horses. This pressure gauge provided an objective, noninvasive, and repeatable tool to measure pain perception levels in horses.



Pressure algometer used to evaluate pain reception.

To evaluate the accurate (and objective) measurement of pain, a technique of pressure algometry uses a pressure gauge to measure pain perception ability to objectively differentiate musculoskeletal pain sites from non-pain sites and to see if it could be used clinically. This second study assessed the ability of the pressure gauge to detect induced back pain in horses. Twenty clinically normal adult horses were used to measure pain perception before and after placement and removal of surgical pins into the dorsal spinous processes of two adjacent vertebrae. To assess changes in measured pain perception, pressure measurements near the surgical sites were compared to surrounding area. The precise area of the surgical sites could be recognized due to localized and substantial decreases in the pain perception levels, compared to surrounding non-painful landmarks. Based on the results of this study, it was concluded that pressure algometry provides a quantitative and repeatable method for assessing the presence of musculoskeletal pain.

A third study looked at the effects of vertebral mobilization and manipulation on kinematics of the thoracolumbar region. Chiropractic care is being used with increased frequency for the conservative management of back pain in horses. Unfortunately, there is limited objective evidence of



Dr. Haussler performing spinal manipulation.

the beneficial effects of chiropractic treatment in horses. The purpose of this study was to measure passive spinal mobility and to evaluate effects of induced back pain and chiropractic treatment on passive spinal mobility in standing horses. Spinal motion was measured in 10 normal adult horses. Baseline vertical displacements, applied force, stiffness, and frequency of the oscillations were measured during spinal mobilization at five sites along the back. As a model for back pain, surgical pins were temporarily implanted into the dorsal spinous processes of adjacent vertebrae at two of the intervertebral sites. The horses were allocated to control and treatment groups, separated by a seven-day washout period. The chiropractic treatment consisted of high-velocity, low-amplitude thrusts applied to the three non-pin placement sites. Control horses received no treatment. The amplitudes of vertical displacement increased from cranial to caudal in the thoracolumbar portion of the vertebral column. At most sites, chiropractic treatment increased the amplitudes of dorsoventral displacement and applied force, indicative of increased spinal flexibility and increased tolerance to pressure in the thoracolumbar portion of the vertebral column. Results of the present study indicated immediate beneficial effects of SMT on spinal mobility in horses.

ACVS Founders' Award for Career Achievement



C. Wayne McIlwraith, BVSc, PhD, Diplomate ACVS, accepts The ACVS Founders' Award for Career Achievement. Left to right: Alan J. Nixon, BVSc, MS, Diplomate ACVS; C. Wayne McIlwraith; and Norman G. Ducharme, DMV, MSc, Diplomate ACVS, Chair ACVS Board of Regents.

The ACVS Founders' Award for Career Achievement, which provides an avenue for recognition of outstanding contributions to the art and science of veterinary surgery by Diplomates of the ACVS, was given to C. Wayne McIlwraith, BVSc, PhD at the 2006 American College of Veterinarian Surgeons (ACVS) meeting. It is only the second time this award has been given.

Dr. McIlwraith is presently director of the Orthopaedic Research Program at Colorado State University. Dr. McIlwraith has been one of the most recognized names in equine surgery and orthopaedic research in the past 50 years and possibly of the last century.

He has been the recipient of numerous honorary degrees following his BVSc degree from Massey University in 1970. He is author or coauthor of over 223 papers in refereed journals and is the primary author or coauthor of 10 textbooks. He has contributed chapters for 31 texts and has been the recipient of numerous awards. Dr. McIlwraith has served on almost every committee in the ACVS. Ultimately, the most compelling of his roles in the ACVS were his terms as president in 1997-1998 and chair of the Board of Regents in 1998-1999.

Through its awards programs, the ACVS is committed to recognizing excellence in veterinary surgery.

(Reprinted from *AVCS Newsletter*)

9th Annual Stallion Auction to Benefit Equine Research

January 14, 2008, to January 21, 2008

Online bidding opens at 11:00 a.m., January 14, 2008, and closes at 11:00 a.m., January 21, 2008 (all times are MST).

Bid Online! Go to www.csuequineortho.com and click on the Stallion Auction link.

Bids do not include chute fees, booking fees, or associated reproductive and veterinary costs. Winning bid amounts in excess of published stud fees are tax deductible.

Proceeds from the Stallion Auction will go to the outstanding equine research programs at Colorado State University. The Orthopaedic Research Center is discovering new ways to treat and prevent joint disease and injury. The Equine Reproduction Laboratory is working to improve techniques for equine reproduction. With your bid, you can help these programs improve the musculoskeletal and reproductive health of horses.

Questions? Call (970) 297-4165 or e-mail Paula.Vanderlinden@colostate.edu. Stallions and minimum bids listed at www.csuequineortho.com



Colorado State University

Research Team Receives First Elastikon Equine Research Award

A Colorado State University research team at the Equine Orthopaedic Research Center led by Dr. Chris Kawcak, associate professor and Iron Rose Chair in Musculoskeletal Research at Colorado State University, has been designated the recipient of the first Elastikon Equine Research Award. The group's research is aimed at avoiding a common type of fracture in horses. Coinvestigators with Dr. Kawcak are Drs. Wayne McIlwraith and Christian Puttlitz at CSU, Dr. Kenton Morgan of the University of Liverpool, and Dr. Tim Parkin of the University of Glasgow.

Kawcak's project addresses the shape of the fetlock joint of horses and how minute differences in shape may be related to condylar fracture, a common injury in racehorses. By developing patient-specific computer modeling,

the researchers help horse trainers and managers differentiate between normal progression and the shape and type of change that indicate oncoming injury.

"This research can be a significant step in warning horsemen before an injury occurs," said Edward L. Bowen, president of Grayson-Jockey Club Research Foundation. "Great strides have been made in treatment of many injuries, but avoiding them is even better."

"We are pleased to be associated with work that has so much potential to help those who help the equine athlete," said Jack Weakley, director of the Sports Medicine Group of Johnson & Johnson Consumer Products Company. "This is a gratifying new extension of Johnson & Johnson's focus on the veterinary market."



Dr. Chris Kawcak (left) receives the Elastikon Equine Research Award from Jack Weakly.

The Elastikon award is made possible by a grant from Johnson & Johnson Consumer Products Company to the Grayson-Jockey Club Research Foundation.

McIlwraith Honored with Colorado State University's Scholarship Impact Award



Colorado State University President Larry Edward Penley presents Dr. McIlwraith with the Scholarship Impact Award at the April 2007 Celebrate Colorado State! Luncheon.

The Scholarship Impact Award, Colorado State University's top annual honor for research accomplishments, was presented to Dr. C. Wayne McIlwraith, professor in the Department of Clinical Sciences in the College of Veterinary Medicine and Biomedical Sciences, director of the Orthopaedic Research Center, and Barbara Cox Anthony University Endowed Chair. The award, given by Colorado State's Office of the Vice President for Research, includes \$10,000 to support the research of the award recipient. McIlwraith was honored at the *Celebrate Colorado State!* Luncheon on April 26, 2007.

McIlwraith's peers have noted his significant accomplishments in veterinary and human orthopedic scholarship in terms of both basic and clinical science.

"Nationally and internationally, Dr. McIlwraith's achievements have been repeatedly recognized by the most prestigious awards possible in his field," said Bill Farland, vice president for research at Colorado State. "There are few veterinary scientists working in any area who have had a greater influence on their discipline."

New Personnel

Dr. Earl Carlson

Dr. Carlson joined the EORC in July 2007 as a part-time faculty research scholar in charge of animal welfare issues. He is a



Fort Collins native and life-long horse owner. Dr. Carlson received his DVM from Colorado State University. He interned at Angell Memorial Hospital in Boston, Massachusetts, and at the Animal Medical Clinic in Lakeland, Florida. He then opened Carlson Animal Clinic in Fort Collins. Dr. Carlson retired from a 26-year career with the State of Colorado Division of Racing Events, where he managed the Animal Welfare Section.

Dr. Carlson's research area focuses on the tracking and statistical analysis of causes of injuries in racehorses and greyhounds. In the last several years, his research emphasis has been placed on racetrack surface analysis and its relationship to injuries. He is the author of several professional articles.

Dr. Carlson's family has a rich history in veterinary medicine. His late father, William D. Carlson, founded the specialty of veterinary radiology and implemented his groundbreaking program at CSU. Dr. Carlson's wife of 25 years, Mary, is also a veterinarian, as well as an author and retired public schoolteacher. They share their lives with two paint horses, three cats, and a dog.

Jodi Callison

Jodi earned her BS in biology from Colorado State University and then worked as a technician in equine ambulatory medicine.



Jodi's interests include radiology and surgery. The EORC hired Jodi in July 2007 to assist as a surgery and clinical technician. Jodi lives in Wellington, Colorado, with her husband Adam, dogs, horses, and barn cats.

Lynsey Bosch

Lynsey received her BA in veterinary technology from Michigan State University, where she worked as a large animal



technician for five years. After moving to Colorado, she worked in private equine practice as both a large animal technician and an anesthesia technician. Lynsey loves spending time with her husband and sons while enjoying many outdoor activities including riding horses for pleasure, sports, and gardening.

Susan James

Susan earned her BA in biology from the University of Colorado and worked as a biologist at the National



Institutes of Health in Bethesda, Maryland, before returning to her native Colorado. Susan has worked for Colorado State University in the histology field for the past two years. Previously, she worked as a research associate at the CSU Arthropod-Borne Infectious Diseases Laboratory, where she assisted with research on ticks as vectors of West Nile Virus and Lyme disease. She also assisted with cancer treatment research the CSU James L. Voss Veterinary Teaching Hospital. Susan joined the EORC team in June 2007 as a research associate and histology technician.

Paula Vanderlinden

Paula joined the EORC team in March 2007 as program coordinator for Dr. McIlwraith. Previously, she worked in the pharmaceutical



industry performing technical writing and document control for clinical trials in humans. Paula will coordinate the stallion auctions, produce the EORC newsletters and lab reports, and assist with other fundraising activities. Paula enjoys living in Colorado and spending time with her husband, sons, family, and friends and especially enjoys time spent at the family "ranch" near Lyons, Colorado.



Advisory Board Member Spotlight: Melanie Smith Taylor



Melanie Smith Taylor's show jumping achievements are well known. From an early childhood on a farm in her home state of Tennessee, she went

on to gain international recognition as both a competitor and a trainer. While training with George Morris in the early 1970s, Melanie was successful in amateur/owner jumper classes before graduating to the Grand Prix level. In 1978, she earned the American Grand Prix Association's Lady Rider of the Year title, and she was also named the AGA's overall Rider of the Year. Her wonderful record that year convinced the AGA that women could perform on completely even terms with men, leading to a decision to discontinue the separate Lady Rider award. To cap off her year, Melanie's mount Val de Loire was named AGA Horse of the Year.

Melanie became one of only two riders ever to win the "Triple Crown of Show Jumping" by winning the American Invitational, the International Jumping Derby, and the American Gold Cup. Melanie was part of the USET's Gold Medal team in the 1979 Pan American Games in Puerto Rico.

At the "Alternate Olympics" in 1980, Melanie won the individual Bronze Medal aboard her beloved horse Calypso. She also placed second that same year in the World Cup Final. She was named the United States Olympic Committee Sportswoman of the Year after winning the World Cup Final in 1982. Riding Calypso, she capped her show jumping career with a team Gold Medal in the Los Angeles Olympic Games in 1985, a year in which she was a finalist for the Sullivan Award, which is given to the nation's top amateur athlete.

Melanie retired from active competition in 1987 and continued to serve the horse world as a television broadcaster,

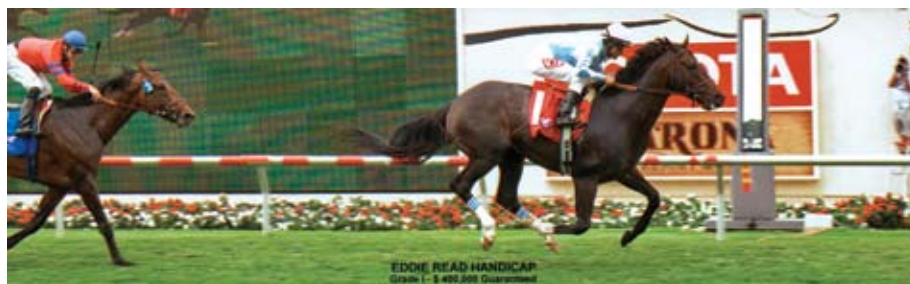
course designer, judge, and trainer of young riders. She was inducted into the Tennessee Sports Hall of Fame in 1982. Melanie is currently assisting George Morris, Chef d'Equipe for the U.S. Equestrian Team, in preparing and

coaching riders for next year's Olympic Games in Beijing (Hong Kong is the actual site of the equestrian events) as well as doing the 2008 Olympic television commentary for equestrian events for NBC.

SUCCESS STORIES



CD Lights, owned by Danny Moats and Winston Hansma and trained by Winston Hansma, developed problems in the right hock at the end of 2004. Radiographs showed him to have OCD in the right hock. Subsequent to surgery he made good progress and in 2006 was NCHA World Champion Stallion as well as Reserve World Champion and Open World Finals Champion.



After Market, owned by Pam and Martin Wygod and trained by John Shirreffs, sustained a sesamoid fracture in his hind fetlock when winning his first race in New York. At that time he was being trained by Bill Mott and won his next two races after coming back from surgery performed by Dr. McIlwraith with Dr. Ryland Edwards at Fairfield Equine Associates. He was then moved to California, and under John Shirreffs training, he came back and won a Grade 3 race and then won the Grade 1 Charles Whittingham Handicap followed by the Grade 1 Eddie Read Handicap (pictured here).

2006 Equine Orthopaedic Research Center Supporters

**William E. Morgan Society –
\$100,000 - \$999,999**

Dan Lufkin – Peter Jay Sharp Foundation
Stavros Niarchos Foundation
Alice Walton – Walton Family Foundation
Allen & Company, Inc.
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**Cornerstone Club –
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Dr. Dennis Luedke – Glenwood Veterinary Clinic
Bend Equine Medical Center
United Way of Kits
Drs. James P. and Amy J. Foley
Dr. Mark J. Beverly
C. George and Ruth Dewell
Drs. James M. and Patricia D. Latham – Mill Creek Veterinary Service
North American Specialty Insurance Company
Traub-Brittan Family Foundation
Londonderry Equine Clinic
Gerald L. Dancy
Dr. James P. Morehead

EORC Advisory Board Meets at CSU

The EORC Advisory Board met in March 2007 at the EORC’s main conference room. Dr. McIlwraith welcomed the group and introduced the board members. Ms. Gail Holmes Allen made some introductory comments on the history of the orthopaedic research program and its development.

After introduction by Dr. McIlwraith of the mission and research focuses at the EORC, the faculty gave overviews of the work within these focuses. A tour of the Gail Holmes Equine Orthopaedic Research Center was then conducted.

There was a period of open questions on our research as well as suggestions from the Advisory Board. Quite a lot of the discussion focused around the work on preventing or decreasing injury in the equine athlete. Catastrophic injury is a very serious problem, but our combined work in novel imaging techniques as well as synovial fluid and serum biomarkers is helping us proceed

towards getting predictive markers of severe musculoskeletal injury. The ultimate goal is to have a commercial platform that would enable us to screen horses with serum biomarkers to recognize ones that were at risk.

Dr. McIlwraith then discussed future plans and needs with the Advisory Board and recent donations and how they have been used before closing the meeting.



Members of EORC Advisory Board Meeting in conference room at Gail Holmes Equine Orthopaedic Research Center. Clockwise from front: David Frisbie, Wayne McIlwraith, Rick Arthur, John Adger, Paula Vanderlinden (background), Melanie Smith Taylor, Mark Dedomenico, Gayle Holmes Allen, Larry Bramlage, Lindy Burch, John Andreini, and Danny Cardoza.



Arthros

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*"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.*

Advisory Board 2007

John H. Adger

Racing and Bloodstock Manager
for Stonerside Stable

Gail Holmes Allen

Quarter Horse Owner and Breeder,
Double Dove Ranch, Longmont,
Colorado

John Andreini

Racing Quarter Horse Owner and
Breeder, J & L Ranch

Rick Arthur, DVM

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

Larry Bramlage, DVM

Specialist Equine Surgeon,
Rood & Riddle Equine Hospital,
Lexington, Kentucky

Lindy Burch

Hall of Fame/Cutting Horse Trainer
and Breeder, Oxbow Ranch

Mark Dedomenico, MD

Thoroughbred Owner and Breeder

Ron Ellis

Thoroughbred Racehorse Trainer

Joe Kirk Fulton

Racing Quarter Horse Owner and
Breeder

John Halley, MVB (DVM)

Veterinarian for Coolmore and
Ballydoyle, Ireland

Bobby Lewis, DVM

Equine Surgeon, Elgin Veterinary
Hospital; President-Elect,
American Association of Equine
Practitioners

Richard Mandella

Racing Thoroughbred Trainer;
Racing Hall of Fame

**Dr. Wayne McIlwraith, BVSc
(DVM), PhD**

Director, Orthopaedic Research
Center, Colorado State University

Maria Niarchos-Gouazé

Thoroughbred Owner, Europe

Dan Rosenberg

Manager, Three Chimneys
Farm, Lexington, Kentucky; Vice
President, Thoroughbred Charities
of America

Bob Rosenthal

Racing Quarter Horse Owner and
Breeder

Dr. Barry Simon

Manager, Ashford Stud (American
Division of Coolmore Stud),
Louisville, Kentucky

Melanie (Smith) Taylor

Olympic Gold Medalist, Show
Jumping

Mr. Alec Wildenstein

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