

Helping Horses and Humans

*With funding from Colorado Equine Parimutuel Racing
and the National Football League Charities*

In the last *Arthros*, we presented a short preliminary note on our evaluation of a novel technique to help heal articular cartilage in the joint. This technique was developed by Dr. Richard Steadman in Vail and involves making small pick holes in the bone to provide access to pluripotential cells and growth factors in the blood without disturbing the subchondral bone plate (Figure 1). Previous research in our laboratory had suggested that if there is significant compromise of the subchondral plate, long term tissue healing is affected. It is hoped that by retention of the subchondral plate and placement of small holes, we can help healing.



Figure 1. Picture of bone awl creating a microfracture penetration site through the subchondral bone.

Finding a way to stimulate cartilage resurfacing is very important to both equine and human patients. Articular cartilage provides a smooth surface at the ends of the bones within a joint. Progressive loss of this cartilage is called osteoarthritis – osteoarthritis causes the need for knee and hip replacement in humans and also is the reason that athletic horses are retired. A thick subchondral bone plate exists under the articular cartilage and provides biomechanical stability of the joint surface. Because the subchondral bone plate is thick, the blood supply is limited compared to other areas deeper within the bone. The challenge in promotion of cartilage healing is to gain access to the rich blood supply beneath the subchondral bone plate without disrupting the biomechanical stability. The blood is thought to supply undifferentiated cells (cells with the ability to become cartilage cells) and growth factors that augment the healing process.

Initial work in human clinical cases by Dr. Steadman has shown promise. However, critical evaluation of this technique in a controlled environment was lacking and it was the purpose of a long term study jointly funded by the Colorado Parimutuel Racing Fund and the Steadman-Hawkins Research Foundation. It was felt that the bone awl would circumvent problems that we previously

encountered with high speed drilling (thermal damage as well as causing a major defect in the subchondral bone plate). To simulate naturally-occurring conditions in both humans and horses, the experimental model (equine) utilized defects on both the radial carpal bone of the knee joint and medial femoral condyle of the stifle joint. The objective of the study was to test the use of arthroscopic subchondral bone microfracture in the augmentation of healing in large osteochondral (articular and calcified cartilage) defects. The horses were subjected to treadmill exercise and evaluated at 4 and 12 months.

It was shown that horses were less lame in the treated versus control knees at 12 months. At the gross observation level, a more uniform character and greater volume of repair tissue was present in treated compared to control defects at both time periods. Histomorphometry indicated more repair tissue in treated versus control defects (Figure 2), and subchondral bone remodeling and the percentage of type II collagen (the characteristic collagen of articular cartilage) occurred faster in treated compared to control defects. No negative side effects were seen with the subchondral bone microfracture and beneficial effects were seen when compared to the control defects. It was felt therefore that this technique could be recommended for use in cases with damaged articular cartilage and exposed subchondral bone where functional repair tissue over the defect is the desired outcome. This study also pointed

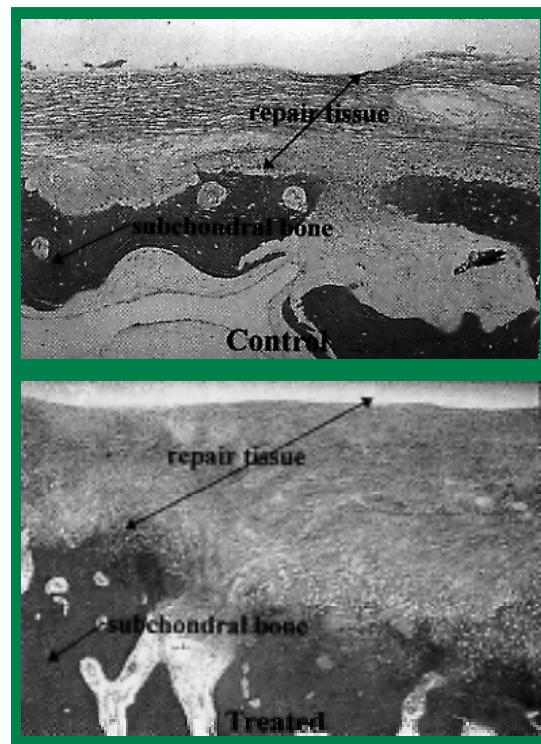


Figure 2. Photomicrograph of control (above) and treated (below) defects.

out, however, that the repair is not perfect and does not result in normal articular cartilage. Work continues to try to find the perfect tissue.

Currently we have a short term study of healing within these defects that is funded by the National Football League Charities. Defects are being examined at two, four, six and eight weeks to see when gene expression for the critical components of articular cartilage (Type II collagen and aggrecan) first appears. We also plan to look at growth factor concentration. From this work we have come to re-

alize that we need more basic knowledge on the very early events in cartilage healing, such as when growth factors are critical to the healing process, so that we can modulate this process.

The current work with subchondral microfracture is being done by Drs. Dave Frisbie, Wayne McIlwraith, Gayle Trotter, Julie Oxford, and Research Technician Sheryl Cammarata. Drs. Richard Steadman and Bill Rodkey of the Steadman-Hawkins Foundation are collaborating.

Intra-Articular Corticosteroids – The Good and the Bad

Joint disorders are a leading cause of pain and disability in equine athletes and a common sequel to these joint disorders is osteoarthritis. Osteoarthritis (OA) is defined as progressive loss of articular cartilage from a joint and is also commonly referred to as degenerative joint disease. To date, OA has no cure but numerous medical treatments have been advocated to either prevent OA or minimize the clinical signs and allow continued athletic competition. One commonly used, but still controversial therapy, is intra-articularly administered corticosteroids. Since the advent of corticosteroid use for joint disorders in horses in 1955, considerable controversy has surrounded their relative risk versus benefit ratio. Some members of the news media have gone so far as to say corticosteroids are the cause of all catastrophic injuries in the racehorse.

Work in our laboratory has compared three commonly used corticosteroids: methylprednisolone acetate (Depo-Medrol), triamcinolone acetonide (Vetalog) and betamethasone esters (Celestone Soluspan). Earlier work has been done with betamethasone (Betavet Soluspan, which is the same product as Celestone Soluspan) and has shown no deleterious side effects. A more sophisticated project

has evaluated Vetalog and Depo-Medrol. This study provides some interesting data, particularly in light of some of the prior allegations that all corticosteroids were bad.

We used our osteochondral chip fragment-treadmill model. There was an osteochondral fragment in one intercarpal joint and the experi-

mental design involved horses receiving placebo, horses receiving corticosteroid in the chip joint, and horses receiving corticosteroid in the opposite joint (Figure 3).

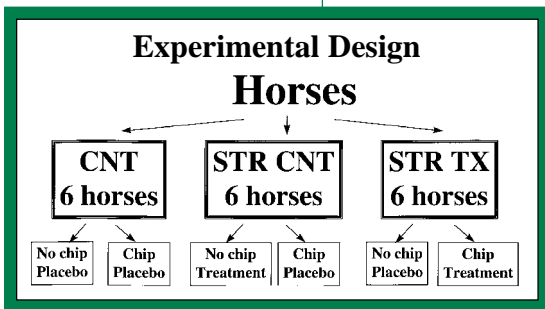
Results from horses receiving Depo-Medrol treatment indicated no difference in degree of lameness in treated versus control horses. Although the synovial fluid HA levels were higher (good), the total protein levels were also higher (indicates higher

degree of inflammation in Depo-Medrol-treated joints). Synovial membrane collected from these joints had less vascularity and intimal hyperplasia, suggesting a more normal synovial membrane but when the articular cartilage was examined, there were some inferior parameters compared to the control group. Although these were not extensive, they did support some effect on metabolism in the articular cartilage.

In contrast, results from horses treated with Vetalog indicated less lameness in Vetalog-treated versus placebo-treated horses, as well as lower total protein and higher HA levels in the joint fluid than in the control group, suggesting a more normal joint fluid environment. Synovial membrane samples from horses treated with Vetalog had significantly less inflammatory cell infiltration, subintimal hyperplasia and subintimal fibrosis compared to the control horses, indicating a more normal synovial membrane in Vetalog-treated horses. Also, the articular cartilage parameters were improved in Vetalog-treated horses compared to the control group. This is a very significant finding. We had previously shown that betamethasone had no deleterious side effects, but to actually show that a corticosteroid enhanced articular cartilage metabolism was very noteworthy.

Another interesting finding was that with both Depo-Medrol and Vetalog, corticosteroid administration in a normal joint can affect a remote joint containing a chip fracture, suggesting that systemic effects are observed with intra-articular administration. The findings of this study show that corticosteroids used in joints can exert certain favorable effects when used experimentally in a manner that simulates their use clinically. Positive, but no negative, effects were observed with Vetalog, whereas some detrimental effects were observed with Depo-Medrol. The results suggest that previous reports of serious detrimental effects from corticosteroids in joints may have been overemphasized. The study does not imply that it is okay to routinely use corticosteroids in joints containing chip fractures; we still feel that surgical removal is the ideal.

Figure 3. Chip and no chip represent intercarpal joint and the respective treatment



Pioneering Molecular Biology Work for Joint Disease in the Horse

As mentioned in a news flash in the last *Arthros*, Dr. Rick Howard isolated the gene sequence for equine interleukin-1 alpha and equine interleukin beta, as well as equine interleukin-1 receptor antagonist. It is known from other species that there are two forms of interleukin-1 (alpha and beta) and that they seem to play major roles in joint disease in the horse. Although interleukin-1 had been demonstrated in synovial fluid of diseased joints in the horse, pure equine interleukin-1 had never been available. Because of this, numerous experiments were conducted on equine articular cartilage using human recombinant interleukin-1. Dr. Howard's research demonstrated that there were differences in the equine interleukin-1 gene sequence compared to human, so we now have the ability to properly test the significance of interleukin-1 in joint disease and the development of osteoarthritis in the horse. Our hypothesis is that interleukin-1 is at the top of the cascade of degradative products that contribute to articular cartilage degradation in equine traumatic arthritis. After isolating the gene sequences, Dr. Howard went on to synthesize the respective pro-

teins from these gene sequences.

Equally or possibly more exciting is Dr. Howard's production of the gene sequence and the protein for equine interleukin-1 receptor antagonist. If our hypothesis is correct, IL-1 is critical in inhibition of this by preventing its access to receptors on the cells, it causes degradative responses, and could provide a physiologic cure. Dr. Howard gained his PhD degree from the above work and has left Colorado State to take a position as Assistant Professor at the University of Virginia. We wish him well and he will be missed.

In the meantime, Dr. David Frisbie has picked up the gauntlet and is embarking on a project with Drs. McIlwraith, Trotter and Oxford, in collaboration with Dr. Chris Evans at the University of Pittsburgh. In this project, the IL-1 receptor antagonist gene will be placed into equine synovial cells and then reimplanted into the knee. It is hoped that the gene can stimulate synovial membrane production of interleukin-1 receptor antagonist in the joint and inhibit the degradative processes of arthritis.

Molecular Biology – An Inside View of Clinical Joint Disease Cases

In this initial series of experiments (the initial funding was provided by Colorado Parimutuel Racing), messenger RNA has been successfully isolated from equine articular cartilage samples using the Trazol technique. Various hybridization probes that were developed for other species have been hybridized to equine RNA and from this the corresponding DNA is being produced. Using techniques developed by Dr. Julie Oxford in Oregon (profiled below) and including reverse transcriptase polymerase chain reaction (RT-PCR), the RNA and DNA content can be amplified to sufficient levels from small samples. After isolation, protein content can also be identified. It is hoped that these techniques will facilitate assessment of the aggrecan and collagen profiles of the articular cartilage samples from

joints in various stages of disease, and also that synovial membrane and articular cartilage samples can be analyzed for the various mediators that are postulated to be involved in equine osteoarthritis. Although we have concepts from work in experimental animals as to the role of materials such as interleukin-1 and metalloproteinases in the degradative process, few of these processes have been clearly identified in equine joint disease. We are now developing the tools to identify these processes in samples taken from clinical cases and we hope to determine the relative significance of each of these postulated mediators over the next two years. Dr. Gayle Trotter is leading this investigation, along with Dr. Oxford and Sheryl Cammarata.

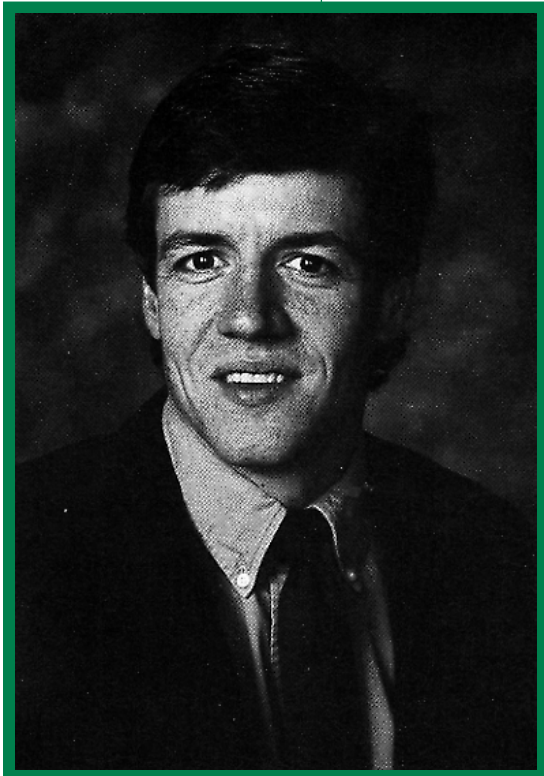


Dr. Julia Thom Oxford

Dr. Oxford received her PhD in Biochemistry in 1986 from Washington State University. She has been a member of the Orthopaedic Research Unit of Shriners Hospital for Crippled Children, Portland, Oregon for the past eight years. Her research focus has been biosynthesis of cartilage extracellular matrix proteins in skeletal development. She is currently funded by the Arthritis Foundation to investigate cartilage extracellular matrix proteins in degenerative joint disease. As Assistant Professor in the Department of Clinical Sciences at CSU she will also focus on the characterization of the mesenchymal progenitors of chondrocytes, including factors that influence commitment to this particular differentiative pathway in repair of cartilage defects.



The Quest to Recognize Bone Damage Before the Development of Chip (or More Severe) Fractures



Dr. Chris Kawcak

Osteochondral fractures and joint damage are major problems in the knee and front fetlock joints of racehorses. The causes, however, are still unknown. Racing and sometimes training alone can lead to chip fractures, complete fractures, or intense bone thickening, all of which can lead to osteoarthritis, fractures, or more severe catastrophic injury. Although some retrospective analysis of fractures has shown that most joint injuries are a result of chronic fatigue, there are no studies that document the sequence of events that occur in joints prior to damage. A study is currently underway at CSU to 1) describe the pathologic sequence of events that lead to joint damage in osteoarthritis, and 2) evaluate tests for early diagnosis of joint damage. This work is being performed by Drs.

Chris Kawcak, Bob Norrdin and Wayne McIlwraith and has received funding from the American Quarter Horse Association and the Morris Animal Foundation.

The investigators are currently studying two groups of horses to detect the effects of strenuous exercise on subchondral bone (the bone that is immediately under the articular cartilage of joints and is damaged during racing and training). One group of horses is being exercised on a high speed treadmill and the other group is being hand walked. Those on the treadmill are exercised with weight five days a week for six months.

During the study, all horses are evaluated clinically, similar to client horses. This includes regular lameness radiographic and nuclear scintigraphic

examination of the knees and front fetlocks. Currently these methods of diagnosis are the best available to equine clinicians. The investigators will also explore the use of computerized tomography (CT), magnetic resonance imaging (MRI) and blood and synovial marker tests to detect early joint damage. A CT scanner at CSU has been used routinely for small animals but rarely for horses. The investigators hope that differences in subchondral bone density between the exercised and nonexercised horses will be detectable with CT and can be used as an indicator of early joint damage. MRI has been used occasionally in cadaver studies on horses and although it has revolutionized the ability to detect subtle joint injuries in humans, there are no reports on the ability of this technique to detect subtle lesions in horses. This is because of the inability with previous equipment to image the equine joint. Finally, the use of blood and synovial fluid markers of joint damage is being explored. As the cartilage and bone of joints are damaged, structural molecules from these tissues are released into the synovial fluid and blood stream. It has also been seen that molecules from the principal components of articular cartilage and bone can be modified by disease and this differential structure identified with certain markers. Our hope for the future is that a blood test can be used to detect early joint disease, which would allow us to monitor a horse's status during training and racing and therefore aid prevention of severe injuries.

Dr. Chris Kawcak is our Ken Atkinson Scholar and his salary and stipend are provided by Mr. Ken Atkinson (previously profiled in *Arthros*). Dr. Kawcak graduated from CSU in 1991. After an internship at Rood & Riddle Equine Hospital in Lexington, Kentucky, he returned to CSU as a surgical resident. He was extremely productive during his surgical residency in both clinics and in research. He became Board certified as a Diplomate of the American College of Veterinary Surgeons (surgery specialist) in 1995 and his PhD work involves the above project.

Conformation and Soundness

For many years, various definite proclamations have been made regarding the effects of conformation on soundness in the athletic horse. As previously documented in *Arthros*, Vol 5, a study is ongoing in Thoroughbreds to investigate the possible relationship between conformation and soundness as well as to investigate whether conformation is inherited. This project is the subject of Tina Anderson's PhD.

The American Quarter Horse Association recently awarded Ms. Anderson, Dr. McIlwraith, and Dr. Nancy Goodman of Los Alamitos, California, a grant entitled *An investigation into the effect of conformation on lameness and orthopaedic injury*

in the racing American Quarter Horse. This project will take place at Los Alamitos Racecourse in 1997. The goal is to objectively measure conformation of a large group of racing Quarter Horses and to determine if certain limb conformations predispose the horses to musculoskeletal disease. Photographs and on-site measurements will be made in California. The data will then be sent to Colorado where the Colorado State researchers will scan the photographs into a computer and analyze them using an image analysis program. This is one of the first attempts to objectively measure conformation in the racing American Quarter Horse.

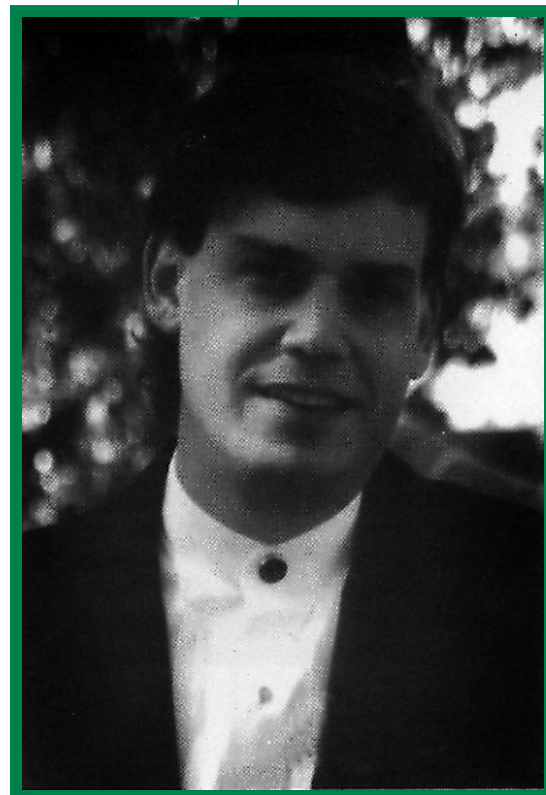


Congratulations – Dr. David D. Frisbie

The prize for the best presentation at the Residents' Forum of the European College of Veterinary Surgeons, Utrecht, in June 1996 was awarded to Dr. David Frisbie. His presentation was on the effects of triamcinolone acetonide in the joint. Congratulations to Dr. Frisbie. Dr. Frisbie has been involved in both the research on Vetalog as well as Depo-Medrol, and also is a principal investigator in the work on the subchondral micropick technique for cartilage healing.

Dr. Frisbie is a 1992 graduate of the University of Wisconsin. After a large animal internship at Cornell University, he came to CSU as a resident in surgery. He completed his residency June 30, 1996 and is now doing his PhD in the Equine Orthopaedic

Research Program. He was very productive in his research as a resident and is currently leading the short term micropick investigation and embarking on research in gene therapy as a potential way of treating arthritis in the horse. The gene therapy work is a natural progression after isolation of the gene sequence for interleukin-1 receptor antagonist by Dr. Rick Howard.



Dr. Dave Frisbie

Intravenous Hyaluronic Acid – A Progress Report

We have previously demonstrated in a controlled experimental study that intravenously administered hyaluronic acid had significant anti-inflammatory effects in inflamed equine knee joints that contained carpal chip fragments. We also showed that there were no deleterious side effects. This research has led to the drug's widespread use in clinical joint disease and most veterinarians are very positive about the beneficial effects.

Now that we know intravenous hyaluronic acid works, the remaining question is why or how does it work. A new project funded by Bayer Pharmaceuticals is investigating the mechanisms of intravenous sodium hyaluronate in the treatment of synovitis in the horse. The investigators are Drs. Kate Savage, Dean Hendrickson and Wayne McIlwraith.

It is postulated that HA may trigger cell surface receptors to cause events that are responsible for the beneficial effects seen after clearance of the drug from the joint (we have previously shown that the effects of the drug last for 50 days, whereas the time in the blood stream is a few minutes). This project involves collaboration with English researchers and utilizes the techniques of fluorescent monoclonal antibody analysis techniques and involves the identification of receptors using fluorescent monoclonal antibodies combined with flow cytometry. After documenting the density of these receptors, we will evaluate whether they are up- or down-regulated by Legend.

Exotic Wagering Funds Equine Research

In 1992, the Colorado State Legislature placed a bet on equine research at Colorado State University. The Colorado Equine Parimutuel Racing program, approved through the Legislature, funds equine research at Colorado State with proceeds from a 0.025% apportionment of funds spent on exotic wagers through simulcasting. To date, the College of Veterinary Medicine and Biomedical Sciences has received \$321,000, providing funding to 13 research projects. "This has given us a stable, long term source of funding to investigate disease processes important to racing as well as the entire horse industry," said Dr. James Voss, Dean of the College of Veterinary Medicine.

This additional funding has enhanced growth of our equine orthopaedic research program. A number of the studies have investigated disease and injury to cartilage, including the micropick technique to aid healing of degenerated cartilage as well as

the effects of corticosteroids on cartilage. More recently, projects funded by exotic wagers include Dr. Gayle Trotter's work in developing molecular biology techniques for evaluating cartilage. These techniques involve extracting RNA from joint cartilage and using probes to examine different components of the cartilage, comparing normal tissue to diseased tissue. Dr. Trotter hopes to determine if cells actually self-destruct when faced with damage or if cells work to repair and rebuild from the damage. The ultimate goal is to modulate what cells do and provide them with the components necessary to put out a normal matrix and stop or slow down deterioration of the cartilage.

Additionally, Dr. Gary Baxter has received funding on the effects of corticosteroids and Dr. Wayne McIlwraith has received funding for evaluation of subchondral bone disease and also articular cartilage healing.



Success Stories

Fearless Freda

Fearless Freda is a three year old filly by Dash For Cash out of Such An Easy Effort and owned by Robert Gentry. This filly was treated at CSU by Drs. Hendrickson and McIlwraith for an unusual shoulder problem that could only be diagnosed with the



help of nuclear imaging. She did not race in her two year old year but has come back in spectacular fashion as a three year old. She won the Texas Classic Derby (Grade I) at Retama Park on October 26 and also beat *Winalota Cash*, the All American Futurity winner in 1995 and the All American Derby winner in 1996. *Fearless Freda* then went on to win the Grade I Breeders' Championship Classic at Los Alamitos on December 22, 1996. In this successful campaign she developed chips in the knees and ankles.

Fearless Freda

She received arthroscopic surgery (Dr. McIlwraith also operated her mother in 1987) and hopefully she can come back at the Grade I level like her mother did after surgery. (*Such An Easy Effort* won the Grade I Quarter Horse Distaff Classic in 1989 after surgery.) A second Gentry Brothers horse (*Cash Legacy*), won the Breeders' Championship Classic that same year, also after surgery.

Air Beduino

Air Beduino (Chick's Beduino x Terresto's Pazazz TB) is owned by John and Kathie Bobenrieth and trained by Connie Hall. This three year old gelding was operated for knee chips in 1995 and came back well in 1996 winning the PCQHRA Breeders' Derby on October 5, 1996 at Los Alamitos. He also won his trial for that race. Because of a history of fastest qualifiers not winning the finals in 1996, the owners were rather apprehensive that they might be jinxed but the horse came through.

Arthos

This 14 year old Dutch Warmblood stallion is owned by Patty Arnett, Fort Collins, Colorado. He was operated in 1994 by Dr. McIlwraith for an unusual core lesion in the branch of the suspensory ligament. After surgical splitting and drainage of the core lesion, *Arthos* came back to compete well in Grand Prix. He then made it into the Irish team (ridden by Damien, an Irish citizen) for the Olympics in Atlanta. He did not win but to make it back to an illustrious standard of competition after the injury is pleasing.

Letthebighossroll

This horse (Flying Paster x Moonlight Jig), owned by Mike Pegram and trained by Bob Baffert, continues to roll. In 1996 he won the Triple Bend Breeders' Cup Handicap (Grade III) at Hollywood Park on June 30, and the Answer Do Stakes by five lengths on July 21 at Hollywood Park. Most recently he won the Crazy Kid Handicap at Del Mar on September 4, 1996.

Evening Snow

After Abigail Kawanakoa's *Evening Snow* (Chick's Beduino x Florentine) won the Los Alamitos Million in December 1995, he had arthroscopic surgery for chips in the knees and ankles. He came back in spectacular fashion as a three year old winning the Grade II AQHA West/Southwest Challenge Championship and breaking the World Record at the same time, going 440 yards in 20.94 seconds (the first horse to race 440 yards in under 21 seconds). As AQHA Executive Vice-President, Bill Brewer, said in "A Look Back at 1996", "I think the world record by this amazing athlete is a shot in the arm for Quarter Horse racing, renewing our passion for the breed's speed." It was also recorded in *The Quarter Racing Journal* that when *Evening Snow* sprinted his way to the world record he hit a peak speed in excess of 54 miles per hour. According to a computer model developed by Dr. George Pratt at the Massachusetts Institute of Technology, *Evening Snow* developed a horizontal force of 550 lbs upon breaking from the gate and reached a peak speed of 54.26 mph at approximately 14.57 seconds after leaving the gate.

Concept Win

This Manila x Conveniently six year old Thoroughbred is owned by Glen Hill Farm and trained by Tom Proctor. He won the Count Fleet Sprint Handicap (Grade III) at Oaklawn Park on April 11, 1996 after being operated in 1995.

Papa John

Papa John is a three year old Appaloosa gelding (Tenacious Tom Thoroughbred x Cracklin Lady) owned by Borges, Melkonian and Melkonian, and trained by John "Mickey" Martin. He started his winning streak as a two year old in July 1995. At the end of 1995, *Papa John* suffered two stress fractures in the cannon bones (one in each leg) and screws were placed through the stress fractures. The legs healed well, screws were removed in early 1996, and *Papa John* started back in race training. Since surgery he has won five races in a row, including the Grade I Classic Derby by seven lengths and his most recent win, the Grade I California Appaloosa Derby, where he won by 6.5 lengths.



Criollito

Criollito is a five year old Thoroughbred (Candy Stripes x Greek Filly) that was a Group III winner in Argentina before being purchased by Bob Baffert for Robert and Beverly Lewis. He was brought to the U.S. in 1995 and had a small knee chip removed by Dr. McIlwraith that same year. In his first race after surgery he won a 6-furlong allowance race at Santa Anita on April 3. In his second start after knee surgery he won the Churchill Downs Handicap at Churchill Downs on May 4, 1996 (Grade III).

Red Hot Rhythm

This Chick's Beduino x Fly Rhythm Fly horse is owned by Hank and Caroline Ward and trained by Brian Koriner. *Red Hot Rhythm* won the Kindergarten Futurity as a two year old. After scoring his fourth consecutive win in the trials for the PCQHRA Breeders' Futurity, Red Hot Rhythm had a rough trip in the October 6 final. He did not win in his last four races in 1995 and then was diagnosed with the knee chip. He was sidelined during the trials for the Los Alamitos Million in 1995 and had arthroscopic surgery by Dr. McIlwraith to remove a bone chip from a knee. He went back into training the first of March and qualified 45 days later with an 18 second work over 350 yards. He won the El Primero del Ano Derby at Los Alamitos on May 3, 1996.

Pugnacious

This three year old Sunnys Halo x Olay Monique gelding is owned by Gary Garber and trained by David C. Cross, Jr, and had arthroscopic surgery for an osteochondroma in the carpal canal in 1995 (one of the first we operated in this fashion). He came back to win the Rushaway Stakes at Turfway Park on March 30, 1996. He had raced unplaced at Del Mar the previous summer as a two year old. This horse is home bred by Gary Garber.

Isitingood

This is a five year old Thoroughbred horse (Crusader Sword x Wancha) owned by Mike Pegram and Terry Henn and trained by Bob Baffert. He had surgery for stress fractures of the cannon bone and came back from surgery to win the Longacres Mile Handicap (Grade III) at Emerald Downs on August 18 and the Fayette Stakes (Grade II) at Keeneland on October 19. On November 29, 1996, he won the \$250,000 Clark Handicap at Churchill Downs for his fourth win in five starts since surgery.

Gershwin

Gershwin is a dressage horse that developed severe osteoarthritis of the pastern. He was brought from Louisiana for a surgical fusion of the pastern joint in October of 1995. The osteoarthritis had progressed to the extent that this was the only option and we have had good success with surgical fusion of hindlimb pastern joints. The horse is now working a normal schedule with lateral work and piaffe and passage. He is 100% sound and the external appearance of the joint is excellent. *Gershwin* is owned by Heather Blitz. She feels there is less swelling than prior to surgery and the horse has shown successfully again at Prix St. Georges. The owner states, "Thank you so much for the excellent work and I hope you can do the same for future horses with this horrible problem". We still need to solve the problem of osteoarthritis, but at least when it occurs in this joint there is a way of returning the horse to serviceability.



Gershwin

Olympic Games – Atlanta 1996

From an equine point of view, the most notable story in Atlanta was the success of the AAEP On-Call Program and the prior research to guard against heat exhaustion and associated injuries in an extremely warm climate for competition. As noted in one publication, there were more veterinarians than horses on the three-day cross country course but the end result was impressive with no catastrophic injuries and the horses all finished in good shape.

Participation of *Arthos* in the Irish Olympic team has already been mentioned under "Success Stories". In addition, Dr. McIlwraith was asked by the New Zealand team veterinarian, Dr. Wally Niederer, to go to Atlanta to examine the New Zealand Three-Day Event Team. Unfortunately, Mark Todd's horse, Kayem, sustained an unusual injury to the pectoral muscles and Dr. McIlwraith spent most of his Olympic time tending this horse with Mr. Todd, Dr. Niederer, and Mary Bromiley, a physical therapist from England who was with the

New Zealand team. Kayem was pulled from the Olympics and Mark was deprived of the opportunity to gain a third consecutive Gold Medal in the individual three-day event (he had won at the two previous Olympics). Currently the horse is being treated in England (where Mark is in residence) and follow-up therapy is being supervised by Dr. McIlwraith with Mary Bromiley. Todd is one of four riders to win successive individual Gold Medals at Olympic games and is the only one to do it in the three-day event. His two previous Gold Medals were on *Charisma*.

Despite this misfortune, New Zealand went on to win individual Gold and Silver with Blyth Tait and Sally Clark, and won the Bronze in the Team. The U.S. was second in the Team three-day event. New Zealand is incredibly strong in the three-day event currently. At the end of 1996, they held the first three places in world rankings with Blyth Tait first, Mark Todd second, and Vaughn Jeffries third.



We Want You to Know

Our Purpose – To help the horse by finding solutions to musculoskeletal problems generally and, in particular, joint injuries and arthritis.

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.

Contributors to Our Program

Ken Atkinson – Colorado	Allen and Company Inc (Gail Holmes) – Colorado/New York
Heather Dedomenico Estate – Washington	James A. and Juanita Winn – Arkansas
Robert Gentry – Texas	Ron Crockett – Washington
Equine Trust Foundation – Arizona	Mr. & Mrs. Jens L. List – California
Sam Britt – New Mexico	Zory Kuzyk – California
Alex Harthill, DVM – Kentucky	Niarchos Family (Alan Cooper) – London
Wayne & Nancy McIlwraith, DVMs – Colorado	Ashford Stud – Kentucky
Mr. & Mrs. Robert Clay, Three Chimneys – Kentucky	Traub-Brittan Family Foundation – California
Robert Story, DVM – New Mexico	James C. Shircliff – Kentucky
Chuck and Cyndy Jenkins, DVMs – California	Vincent A. Baker, DVM – California
von Hemel Racing Stable – Nebraska/Oklahoma	Vince Jessup, DVM – California
Mark Dedomenico, MD – Washington	Joelle Rogers – Texas
Woods Creek Training Center – Washington	Video and TV Hire (Jane Apter) – England
Dr. Fernando Canonici – Italy	Colorado Equine Parimutuel Racing Fund
Allez France Stables Ltd (Alec Wildenstein) – New York	CSU College Research Council
John Harris, DVM – Colorado	American Horse Show Association
R. A. Canning – New Mexico	Grayson Jockey Club Foundation
Mr. & Mrs. R. L. Rosenthal – California	Karl Storz Endoscopy America
Ed Murray, DVM – Texas	Bayer Animal Health
Bill Keller – Colorado	Steadman-Hawkins Sports Medicine Foundation
Virginia Wood – Arizona	Luitpold Pharmaceuticals
	American Quarter Horse Association
	Veterinary Orthopedic Society
	Morris Animal Foundation

Options for Making Contributions

There are a number of ways an individual or group can make a tax deductible charitable contribution. They include cash, securities such as stock certificates, and gifts-in-kind such as horses, computers, or lab equipment.

Donors can also make a planned gift by designating all or a portion of their estate to the program.

Other options include life insurance, charitable gift annuities and charitable remainder trusts.

Gifts of real estate are also accepted, oftentimes saving the donor capital gains tax. For more information on these options, please contact Dr. McIlwraith (970-491-8542), or call the College Development Office at 970-491-3932.

Would You Like to Help?

- Yes, I would like to financially assist the Equine Orthopaedic Research Program (42113) at Colorado State University with a tax-deductible contribution.
- My gift of \$ _____ for the Equine Orthopaedic Research Program is enclosed.

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Equine Sciences
Colorado State University
Fort Collins, Colorado 80523

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