



An International Center for Research and Education — Keeping People Active

PATIENTS IN THE NEWS

Steve Barton: The Show Must Go On

Editor's Note: The following profile is based on an interview by Dick Needham. Mr. Needham is Editor of the Skier newsletter "Inside Tracks" and Senior Contributing Editor of "Ski" Magazine.

If Steve Barton has any advice for aspiring actors, it might be "Watch where you step." Barton, today one of the world's most highly acclaimed actors and dancers, fell into a large brush-covered hole while on a casual run as a first-year student at the University of Texas at Austin—and the injury that resulted, a severe double meniscus tear to his right knee, subsequently spiraled into a series of misfortunes that plagued him for 28 years and nearly ended his career.

Along the way, Barton has been involved in 10,000 live performances in more than 70 productions in seven countries. A multi-talented performer who sings, dances, plays several instruments, directs and teaches, Barton has performed in Europe, London's West End, Los Angeles and on Broadway. He has sung for several Presidents, the Royal Family and, he says, "the occasional children's birthday party."

He has also had 16 knee operations. And for 28 of his 38 years on stage, he has lived, worked and dealt with the complications of a double meniscectomy gone wrong—the result of a disastrous infection that developed after early knee surgery and has followed him throughout his career.

Barton's knee history reads like a Greek tragedy: After his double meniscus tear and repair in 1972, he injured his right knee meniscus in 1973, had it removed, and developed a staph infection in the joint. In 1979, he underwent a high tibial osteotomy (a realignment of the tibial plateau) in his right leg. During this period, Barton had seen or been operated on by specialists in Denmark, Switzerland, England, Austria, Germany, New York, Los Angeles, New Haven, Boston and Pittsburgh.

In his own words: "I was pretty much at the

(Continued on page 7)

SPORTS AND WELLNESS

Weight-Bearing Exercise: The Secret to Safer Skiing

By William E. Rice

Editor's note: The following is an adaptation of an article that appeared in the December 1999 issue of the "The Winged Foot," the magazine of the New York Athletic Club.

Bill Rice is a staff announcer for ABC, where he has voiced many ABC News programs over the years. Rice believes the application of weight-bearing exercise is vital to all sports participants and that resistance-cord devices allow for the creation of portable exercise rooms wherever we go.

While skiing last March I took a fall that really did me in for the season. I was at Hunter Mountain, New York, on my very first run of the day, skiing with four friends, when I noticed my skis were hooking on me. I felt a pulling in my ski tips, bringing me around with little balance. It was a

(Continued on page 9)



PHOTO COURTESY OF JOHN KELLY.

STEADMAN♦HAWKINS RESEARCH UPDATE

Knee Preservation and Realignment: A Joint Solution

By William I. Sterett, M.D., Steadman-Hawkins Clinic and Steadman♦Hawkins Sports Medicine Foundation.

There is nothing more important in terms of how long a knee will last than the alignment of the knee. When we draw a line on the front of the leg from the center of the hip down to the center of the ankle, that line should fall right in the center of the knee. When that happens, it means that, with every step we take, we put about half our weight on the inner side of the knee and half of our weight on the outer side of the knee. Some people are born bowlegged, some people are born knocked-kneed, and some may acquire any one of these con-

(Continued on page 11)

IN THIS ISSUE

Drs. Steadman and Rodkey
Recipients of Prestigious
Gots-Beirsdorf Research Award

Get Strong and
Stay Strong

Knee Injuries and
The White Circus

Meet the
New Fellows

An Opportunity to Contribute—and A Special Thank You

Over the years, the Steadman◆Hawkins Sports Medicine Foundation has been privileged to receive numerous gifts from friends and supporters who are strong believers of our work and have remembered the Foundation in their estate plans. Through the creation of bequests, charitable trusts and other creative gifts that benefit both donors and the Foundation, our supporters have become visible partners in our mission to keep people physically active through orthopaedic research and education in arthritis, healing, rehabilitation and injury prevention.

To honor and thank these friends, the Board of Directors has created The Founders' Legacy Society, an honorary society created solely for the purpose of thanking those individuals who are investing not only in our tomorrow, but also in the health and vitality of tomorrow's generations. Society members will enjoy a number of benefits—particularly the annual appreciation event. If you have included the Foundation in your estate plans in some way, the Board would like to welcome you into the Society. With the creation of the Society, the Board is pleased to extend Founding Member status to all who advise us of their plans by March 31, 2001.

Our future in accomplishing great strides—from understanding degenerative joint disease, joint biomechanics and osteoarthritis, to providing high-quality health care, treatment and rehabilitation, to education and training programs and making our advances available to everyone—is driven by the vision and forethought of friends and supporters who include the Foundation in their plans.

To help you explore a variety of ways to remember the Foundation, and to obtain income and tax benefits at the same time, we are introducing a new program, called Planned Giving. This program can provide you with material on the gift plans mentioned here as well as others. For information on gift-giving or The Founders' Legacy Society, contact John McMurtry at (970) 479-5781 or Patricia Herrington at (970) 479-9797, ext. 5271. Or simply return the enclosed envelope. All information is confidential and a request for information does not represent an obligation. ■

MEET OUR STAFF

Managing the BioSkills Lab—and Much More

By Rachel Lenz, Development Associate

For Karyll Nelson, R.N., there are no typical days at the Steadman◆Hawkins Sports Medicine Foundation. Karyll, who celebrated her one-year anniversary at the Foundation in April, is the Executive Assistant and BioSkills Laboratory Director.



Karyll Nelson, center, with fellows Dr. Sumant Krishnan, left, and Dr. Mark Curzan, right.

(PHOTO COURTESY OF JOHN LENK)

As the Executive Assistant to COO Topper Hagerman and CEO Charles Dillman, Karyll's responsibilities include a wide range of administrative duties. She is for all intents and purposes the "gate-keeper" of the Foundation, directing inquiries to appropriate staff members and navigating meeting schedules for doctors, board directors, and staff. "Karyll plays an important role by being the front line for the Foundation. She interacts with donors, doctors and everyone who needs information from the Foundation," says Topper Hagerman.

Just as challenging, and just as exciting, to Karyll is her position as the BioSkills Lab Director. The BioSkills Lab is a cadaver laboratory that is designed to facilitate surgical research and education. The Lab is available to Steadman Hawkins Clinic and Foundation Fellows, doctors, corporate sponsors and staff for training, research and/or product testing and development.

Located on level "0" of the Vail Valley Medical Center, the Lab currently has two complete arthroscopy stations, donated by Linvatec, as well as extensive knee, shoulder and hand instrument systems and accessories. The Lab enables users to perform arthroscopic as well as open surgical techniques, providing unique opportunities to perfect and develop procedures and products. The BioSkills Lab was used by Dr. Steadman to develop the "microfracture" technique, a procedure now widely used to enhance chondral resurfacing.

On August 19, the Vail Cartilage Symposium featured surgical demonstrations performed in the BioSkills Laboratory by Dr. Richard Steadman, Dr. Lars Petersen, Dr. Allan Gross, Dr. László Hangody and Dr. Kelly Cunningham. These laboratory demonstrations were telecast to The Lodge at Vail where Symposium attendees observed the surgeries and directed questions to the physicians as the procedures were being carried out.

Karyll, originally from Mankato, Minnesota, manages the Lab and its inventory and "enjoys the opportunity to work with the Steadman Hawkins Clinic physicians, visiting doctors, and Foundation Fellows. They have a great interest in working in the BioSkills Laboratory, and it's wonderful having the opportunity to learn from them. The current group of Fellows has a Lab session scheduled every Wednesday that concentrates on a different joint each week using both arthroscopic and open procedures. The doctors are excellent in explaining the procedures they are performing to interns and viewers. They are very detailed and thorough."

Maintaining the inventory and instruments for the Lab is a very expensive endeavor. Funding is provided by user fees and gifts by corporate sponsors, individuals and corporations.

What does Karyll think of the Foundation and her responsibilities? "I love working here," she says. "It's really a great place to be. I have a lot of respect for the wealth of knowledge within the Foundation and the opportunities that people can have here. And it's great having two jobs... It is always a learning experience." ■

FOURTH ANNUAL STEADMAN◆HAWKINS ALL-STAR SKI CELEBRATION, JANUARY 19-21, 2001

Major Fundraiser for Arthritis Research

Winter in the Vail Valley wouldn't be the same without what has now become a tradition: the Steadman◆Hawkins All-Star Ski Celebration. All-Star participants have an opportunity to share three days of fun, glory, skiing and ski racing with former Olympians whose medal-winning careers were preserved by the skills of Drs. Steadman, Hawkins and Sterett. The fun includes a concert by entertainers who in the past have also been patient-alums of Steadman-Hawkins. Headline performers have included Broadway Star Mandy Patinkin, singer Judy Collins and Broadway actor, singer and dancer Steve Barton.



First place 2000 team, from left to right: Gretchen Piper, George Tauber, Cindy Piper, Diann Roffe-Steinrotter, Polly McCrea, and Chrystine Tauber.

The proceeds generated by the celebration support Foundation research of degenerative arthritis, a leading cause of work disability world-wide that currently afflicts 20.7 million Americans.

For information on how you can join us January 19-21, 2001 for the Steadman◆Hawkins All-Star Ski Celebration, contact Rachel Lenz, (970) 479-5786, rachel.lenz@shsmf.org ■

DRS. STEADMAN AND RODKEY CO-RECIPIENTS OF GOTS-BEIRSDORF RESEARCH AWARD 2000

Drs. J. Richard Steadman and William G. Rodkey of the Steadman◆Hawkins Sports Medicine Foundation, along with Dr. Shu-Tung Li, are the co-recipients of the GOTS-Beiersdorf Research Award 2000. The Award was given for a paper submitted in January describing the history of the Collagen Meniscus Implant (CMI) from its inception to the present day. This new implant and the technique for its installation have received widespread interest as the leading edge in meniscal

knee repair. Drs. Steadman, Rodkey and Li used innovative tissue engineering techniques and collagen matrix technology to develop a resorbable collagen scaffold, the Collagen Meniscus Implant. The CMI supports ingrowth of new tissue and eventual regeneration of lost meniscus cartilage.

The GOTS-Beiersdorf Research Award is the most prestigious orthopaedic research award in the German-speaking world. It is presented only once each two-to-four years. "Judged by a jury of internationally recognized experts from throughout the world," said Steadman◆Hawkins Sports Medicine Foundation CEO, Dr. Charles J. Dillman, "this award recognizes orthopaedic research that impacts on quality-of-life issues. The work done by Drs. Steadman, Rodkey and Li on CMI is groundbreaking. The doctors are proud of their work and pleased that the Award will raise visibility for CMI, taking it to the next level of global scientific credibility."

Dr. Steadman founded the Steadman◆Hawkins Sports Medicine Foundation in 1988. Since July 1991, Dr. Rodkey has served as Director of Basic Science Research and Educational Consultant to the Steadman◆Hawkins Sports Medicine Foundation. Prior to that, he was Chief of the Military Trauma Division for the Letterman Army Institute of Research. Dr. Li is Senior Vice President of Research for ReGen Biologics. He joined ReGen in 1990 following 28 years of research in collagen and collagen-based medical products.

The GOTS-Beiersdorf Research Award 2000 was presented during the GOTS meeting in June in Munich, Germany, at which Dr. Rodkey presented the paper. In addition, Dr. Steadman served as this year's GOTS Presidential guest speaker. During the meeting, representatives from German-speaking television, radio and print media from Germany, Austria and Switzerland interviewed the doctors at a special press conference. ■

STEADMAN◆HAWKINS UPDATE Publications, Presentations, and Research

Microfracture, the procedure pioneered by Dr. J. Richard Steadman, is rapidly gaining acceptance worldwide among orthopaedists as the initial procedure of choice for treating cartilage injuries in the knee. Congratulations to the Foundation and team of Drs. Steadman, Rodkey, Rodrigo, McIlwraith, Singleton and Clinical Research Director Karen Briggs for authoring a landmark chapter on Microfracture in the medical textbook scheduled for release in 2001: *Techniques in Knee Surgery*, by Christopher D. Harner, M.D., Kelly G. Vince, M.D., and Freddie H. Fu, M.D., Lippincott, Williams & Wilkins, Philadelphia, 2001. The Chapter is entitled "Microfracture Procedure for Treatment of Full-thickness Chondral Defects: Technique, Clinical Results, and Current Basic Science Status."

Dr. J. Richard Steadman gave the Presidential Lecture at the GOTS-Beiersdorf Research Award ceremonies in Munich, June 29-July 2. Both he and Basic Science Research Director **Dr.**

(UPDATE cont. from pg 4)

William G. Rodkey were presented with the GOTS-Beiersdorf Research Award. The topic was "ACL Surgery and Rehabilitation of Professional Sportsmen."

Dr. Steadman recently contributed the foreword for *Knee Pain: The Self-Help Guide*, a new book by Dr. John Garrett, a nationally known knee surgeon. The book covers symptoms, treatment and prevention options, exercises and nontraditional therapies.

Dr. William I. Sterett presented Grand Rounds at Brigham and Women's Hospital, June 7, through the Harvard Combined Orthopaedic and Residency Program. His topic was "Chondral Resurfacing and High Tibial Osteotomy in the Varus Knee." Dr. Sterett presented the same topic to medical residents at the University of New Mexico on August 8.

Also on August 8, **Karen Briggs**, director of Clinical Research, presented Grand Rounds at the University of California, Davis, Department of Orthopaedics. Her topic was: "Developing and Managing a Patient Database for Outcomes Research."

Faculty Appointments

Michael Torry, Ph.D., director of the Biomechanics Research Laboratory, and senior staff scientists **Kevin Shelburne, Ph.D.** and **Michelle Sabick, Ph.D.** have been named affiliate faculty members at Colorado State University College of Veterinary Medicine and Biomedical Sciences. Dr. Torry presently holds an adjunct faculty position at the University of Colorado at Boulder in the Department of Applied Physiology and Kinesiology. Drs. Sabick and Shelburne have recently been appointed adjunct faculty members at the Colorado School of Mines Department of Mechanical and Biomedical Engineering.

Foundation's Biomechanics Research Laboratory Joins Elite National Educational Association

The Biomechanics Research Laboratory has joined a prestigious national consortium to improve bioengineering educational technologies across the country. According to Dr. Michael Torry, the group will be sponsored by the National Science Foundation and includes Vanderbilt University, Northwestern, University of Texas, and Harvard/MIT (VANTH). Through VANTH, the Foundation will be an educational training site hosting college and graduate-level interns. Future projects may include the production of educational videos and the development of a website on the knee with links to the Foundation's website.

Board of Directors in the News

Congratulations to Steadman♦Hawkins Sports Medicine Foundation Board Member **Earl G. Graves, Sr.**, whose *Black Enterprise* magazine recently celebrated 30 years of publica-



Earl G. Graves, Sr.

tion. A cover story in the August 31st *USA Today* reported on the many successes of the publication.

Mr. Graves is also Chairman Emeritus of Pepsi-Cola of Washington, D.C., L.P. and General Partner of the Greenwich Street Fund. He serves on the Executive Board of the National Office of the Boy Scouts of America and is a Board member of Chrysler Corporation, Aetna Life and Casualty company, AMR Corporation (American Airlines), Federated Department Stores, Inc., Rohm & Haas Corporation, Howard University, The Committee for Economic Development, New American Schools Development Corporation, TransAfrica Forum, and the American Museum of Natural History and Planetarium. Mr. Graves was recently inducted into the American Academy of Arts and Sciences.



Australian golfer and Steadman♦Hawkins Sports Medicine Foundation Board member Greg Norman is surrounded by onlookers and security officials as he runs with the Olympic Torch over the Sydney Harbor Bridge prior to opening day of the 2000 Summer Olympic Games.

(AP PHOTO/CHARLES KRUPA)

Two-time British Open Golf Champion and Board member **Greg Norman** underwent successful arthroscopic surgery on his right hip June 28 for treatment of a torn labrum and thermal tightening of the hip capsule. Dr. Marc J. Philippon performed the procedure and was assisted by **Dr. Richard J. Hawkins**, who performed arthroscopy on Norman's shoulder in April 1998. In both operations, Dr. Hawkins used the Oratec radio-frequency thermal device known as the Heat Probe to arthroscopically shrink the capsular tissue. Rehabilitation procedures for this new technology are being developed by the Foundation.

Norman recovered from the surgery and is back playing golf. In August, he was fourth behind Ernie Els at the International in Castle Pines, Colorado—five weeks following surgery.

As a Board member, Norman is assisting the Foundation in researching the biomechanics of the golf swing and in the preven-

tion of injuries related to the game.

Norman was also honored in his homeland, Australia, as an Olympic Torch Bearer for the 2000 Summer Olympic Games.

Foundation Board member **Howard P. Berkowitz**, founder and managing partner of HPB Associates, L.P., a private investment firm in Manhattan, is beginning his fourth year as National Chairman of the Anti-Defamation League. Mr. Berkowitz also serves on the boards of the Cancer Research Institute, Manhattan Institute, New York City Ballet and Wharton Undergraduate School. He is a member of the Steadman♦Hawkins Sports Medicine Foundation's Executive Committee and chairs the Finance Committee.

Dr. J. Richard Steadman, who has served as Chairman of the Medical Group for the U.S. Ski Team since 1976, has been named Chairman and Chief Physician for the United States Ski and Snowboard Association (USSA), the national governing body for snow sports. In this new role, Dr. Steadman and the Physicians Committee will provide resource support and direction to the USSA Medical Program by making recommendations on policy and procedures governing medical care of USSA athletes.

USSA also announced that Board member **Dr. William I. Sterett** will become Head Team Physician for the U.S. Women's Alpine Ski Team. In 1999, Dr. Sterett was appointed as the U.S. representative to the International Ski Federation (FIS) Medical Committee, which oversees medical and safety issues in international competitions.

In Memoriam

Board member **Bruce B. Johnson**, co-founder of the Denver law firm Otten, Johnson, Robison, Neff & Ragonetti, died of cancer on March 8, 2000. Besides serving as an invaluable resource to the Foundation's Board, Mr. Johnson was chairman of the American Bar Association's Special Committee on Housing and Urban Development, was a member of the Board of Editors of the *Denver Law Journal*, and a member of the American College of Real Estate Lawyers. He also served on the Board of Governors of the Colorado Bar Association and the House of Delegates of the American Bar Association. He is remembered in the Colorado community for his contributions to many fund-raising efforts and civic activities, including the Denver Club and the Cleo Wallace Center.

MEDIA

In early summer, the Foundation was again in the national spotlight. **FOX Health Network's *Forever Young*** produced two shows on the Foundation. The shows aired on June 26 and July 6. Each show was repeated once during each of those weeks and will air at least ten more times during the next twelve months. The show's theme—keeping people active—covered microfracture, high tibial osteotomy, thermal heat probe, and rehabilitation.

Newsweek's latest Foundation article, "Back Health for Spring," appeared in the May 29 issue. The article by **Dr. J. Richard Steadman, Julie Frank, M.S., P.T.** and **Sean McEnroe, P.T.** offers suggestions for preventing back injuries and maintaining a healthy back. An adaptation of the article "Spring Back" is published in the Foundation's Spring/Summer 2000 Newsletter.

The world's most popular spectator sport—soccer—continues to look at Vail's Steadman-Hawkins Clinic in its treatment of injured superstars. England's ***Liverpool Daily Post & Echo*** published an article—"Redknapp Flies to See American Expert"—about their local Liverpool soccer midfielder, Jamie Redknapp, who flew to Vail to consult with Dr. Richard Steadman about his injured right knee. The newspaper reported that "Liverpool is dampening down the severity of

Redknapp's problem, but his dreadful record of injuries—especially while on international duty—suggests his future could hinge on Dr. Steadman's verdict. However, the success of the American doctor in treating other footballers offers Redknapp real hope of battling back from his latest injury nightmare."

Dr. Steadman performed a microfracture procedure in July to regenerate cartilage in Redknapp's right knee. Steadman also previously treated former Liverpool striker Karl Heinz-Riedle while at Borussia Dortmund and Patrik Berger as a teenager. He also operated successfully on PSV Eindhoven star Ruud van Nistelrooy. ■

U.S. SKIING AWARDS DR. STEADMAN HIGHEST HONOR

Dr. J. Richard Steadman of Vail, the U.S. Ski Team surgeon whose skills have helped repair U.S. athletes for more than two decades, was honored as winner of the Julian Blegen Award, the highest honor bestowed by the U.S. Ski and Snowboard Association (USSA). The USSA is the national governing body for all snow sports in the United States.

Steadman, founder of the Steadman◆Hawkins Sports

Medicine Foundation and Clinic, has operated on such Ski Team stars as Picabo Street, Tommy Moe, Cindy Nelson and Hilary Lindh, Phil and Steve Mahre, Tamara McKinney and Christin Cooper—all of whom were Olympic or World Championship medalists. He was



Dr. Steadman, center, and U.S. Ski Team Alpine Director Bill Marolt, right, congratulate U. S. Ski Team member Phil Mahre, left, after winning the Silver Medal in slalom, at the 1980 Winter Olympics in Lake Placid, New York.

also one of the founders of the U.S. Ski Team's volunteer doctor's program, bringing medical support to U.S. athletes competing around the world. He was cited for his years of tireless service on behalf of the organization, including more than two decades as an active trustee of the U.S. Ski and Snowboard Team Foundation.

"We celebrate the athletes, who have won Olympic and World Championship medals or World Cup races," said USSA President and CEO Bill Marolt, "but all of those athletes would be the first to tell any of us they couldn't have done it without Dr. Steadman and his surgical wizardry. But his voluntary contributions go far beyond fixing torn ligaments. Dr. Steadman represents the very best of everything we want USSA and our athletes to be." ■

EDUCATION

WELCOME 2000-01 FELLOWS Six New Physicians Introduced

Late summer signals the beginning of a new year for the incoming "class" of Steadman♦Hawkins Fellows. Regarded as one of the most prominent academic and clinical Fellowship programs in orthopaedic sports medicine, six new orthopaedic surgeons are selected from a pool of more than 150 applicants.

Steadman♦Hawkins Fellows spend their year refining skills and learning new techniques from Drs. Steadman, Hawkins and Sterett. The Fellowship program includes an opportunity to participate in research with Foundation scientists. Each Fellow will be actively involved in Clinical Research, Basic Science and Biomechanics/bioengineering research. The Fellows will also experience "hands on" medical coverage of Major League Baseball's Colorado Rockies, the NFL's Denver Broncos, the U.S. Ski Team, and Eagle County High School sports teams.

The stream of knowledge and information flows both ways. The Fellows, having completed their formal training from leading orthopaedic programs, share knowledge they have gained from years of training with the physicians and scientists of the Foundation.

Mark Curzan, M.D.

Dr. Curzan completed his residency at Duke University Medical Center. Prior to his residency, Dr. Curzan received his undergraduate degree in cybernetics and attended medical school at the University of California, Los Angeles. As a medical student, he received the Lange Medical Publications Award and, during his residency, he served as head resident team physician for Duke University and North Carolina Central University. Dr. Curzan is also a National Merit Scholar recipient.

Sumant Krishnan, M.D.

Dr. Krishnan completed his residency at the University of Texas-Southwestern Medical Center at Dallas. He earned his Bachelor of Arts Degree in economics and graduated summa cum laude from Rice University. An honors graduate from Baylor College of Medicine, Dr. Krishnan was elected to Alpha Omega Alpha Honor Society and received the Baylor College of Medicine Alumni Scholarship. In addition, he has been All-State Musician of Texas in piano and National Scholar for Voice during his years at Rice University.



2000/2001 Fellows, left to right: J. Richard Steadman, M.D., Sumant Krishnan, M.D., David Gazzaniga, M.D., Michelle Cameron, M.D., Mark Curzan, M.D., Peter Millett, M.D., Richard J. Hawkins, M.D., and John Tokish, M.D.

(PHOTO COURTESY OF KAREN MELHART)

David Gazzaniga, M.D.

Dr. Gazzaniga graduated from Dartmouth College with a degree in biology and attended Dartmouth Medical School. He completed his residency at the Harvard Combined Orthopaedics Residency Program. As an undergraduate student-athlete, he was captain of the varsity football team and was awarded the Bob Blackman Trophy for most valuable player. He received a General Surgery Fellowship at the Beth Israel Hospital and a Post-Graduate Research Fellowship at the Children's Hospital Department of Orthopaedics Molecular Biology Laboratory.

Michelle Cameron, M.D.

Dr. Cameron began her academic career at the University of Missouri-Kansas City, followed by studies at the medical schools of both the University of Missouri and Pittsburgh and residency at Johns Hopkins Hospital, Department of Orthopaedics. Dr. Cameron's interest in research is evident by the fact that she has been published in *Arthroscopy*, *American Academy of Orthopaedic Surgeons*, *Journal of Bone and Joint Surgery*, *Orthopaedics*, *American Journal of Sports Medicine*, and *Journal of Arthroplasty*.

Her honors include membership in the Ennis Association of

Orthopaedic Friends, Alpha Omega Aloha Medical Honor Society, Phi Beta Kappa Honor Society and graduating summa cum laude with special distinction at the University of Missouri. She received the Herodicus Award for her outstanding residence research paper in 1996.

Peter Millett, M.D.

Dr. Millett spent his academic career at the University of Scranton as an undergraduate and attended Dartmouth Medical School. He attended the Hospital for Special Surgery for his residency. His academic achievements include Dartmouth-Mosenthal Surgical Scholar and Dartmouth Medical School Research scholar. He is a member of Alpha Epsilon Delta Honor Society, Phi Alpha Theta Honor Society and graduated Magna Cum Laude from the University of Scranton. Dr. Millett also received Intern of the Year for a surgery internship at North Shore University Hospital (Cornell).

John Tokish, M.D.

Prior to his residency at the University of Arizona Health Sciences Center, Dr. Tokish attended the United States Air Force Academy for his undergraduate degree in biochemistry and the University of Washington School of Medicine. His honors include membership in the Alpha Omega Alpha Honor Society, recipient of the House Officer Educator of the Year at the University of Arizona in 1997 and 1998, and the Leonard F. Peltier Award for Excellence in Research. Dr. Tokish has been published in such peer-review journals as *Journal of Arthroplasty*, *Techniques in Orthopaedics*, and *Journal of Orthopaedic Trauma*. ■

(PATIENTS IN THE NEWS cont. from pg 1)

end of my rope—depressed, unable to walk, much less work at my profession—and I'd been told by any number of specialists that I would have to 'give up' the career I had been training for my entire life. But being a hard-headed Texan, I couldn't believe that nothing could be done to help me get back on stage. I couldn't—wouldn't—accept defeat. I had to believe that *something* could be done to fight the constant, chronic pain that was threatening to take over my life."

It was then, in 1994, that Barton learned about the pioneering discoveries that were being made at the Steadman◆Hawkins Sports Medicine Foundation and the remarkable advances that were being made in surgery and rehab.

"When I met Dr. Steadman, the thing that impressed me was his immediate sizing up of the facts and his understanding of the misery it was creating in my life. He didn't sugar-coat anything. He spoke to me as pro to pro and told me straight out that a total knee replacement was in the picture down the road but that the prognosis was good for microfracture. He said if we had to clean things out every couple of years or so, we should—and try to stave off the inevitable as long as possible. The techniques he spoke of would be used to prolong my 'shelf life,' so to speak, as a performer."

Barton has now been successfully operated on by Dr. Steadman and his colleagues three times—microfracture on the right knee in 1994, an ACL reconstruction on his left knee in 1996, total knee replacement this past March—and since 1994 he has been "steadily" working. The microfracture was performed by Dr. Steadman, the ACL reconstruction was performed by Dr. Benedetto of Innsbruck, Austria, an

acquaintance of Dr. Steadman, and the knee replacement, Barton's latest surgery, was performed by Dr. Kevin Plancher of Stamford, Connecticut, a Steadman-Hawkins Fellow well-versed in the techniques, surgical as well as rehabilitatory, pioneered by the Foundation. Barton will soon be off to Europe for yet another performance, this time as Jekyll and Hyde in preparation for the opening of *Vampires* on Broadway this fall.

"What impresses me about the Foundation's work," says Barton, "is the commitment to the exploration of new modalities and the determination to find the things that work. It's one thing to be theoretical and quite another to actually get out there and

do it. And that's what the Foundation's research team has done—they've turned up solutions that are practical. Especially as a professional, in whatever sport or activity you're involved in, you have to believe that the amount of time you invest in something is going to give you a return. That's what I most appreciate—the practicality of the Foundation's research, a 'this works' approach that can be seen in the



Steve Barton in
Phantom of the Opera.

way surgery is performed and the way post-op therapy is approached.

"I couldn't have done it without the wonderful teams of doctors and researchers, therapists, and caring staff at Steadman-Hawkins. They've become the mainstay in my life. Their innovative techniques and therapies have helped save not only my career, but my sanity. They will always have my support and gratitude for the commitment they bring to excellence and the groundbreaking advances they've brought to the world of sports medicine." ■

HEALING RESPONSE: AN ALTERNATIVE TO ACL RECONSTRUCTION

Latest Findings Identify Two Healing Proteins

By William G. Rodkey, D.V.M.

Editor's Note: Dr. Rodkey is director of Basic Science Research for the Steadman◆Hawkins Sports Medicine Foundation.

Ligament injuries to the knee continue to provide challenges for both the patient as well as the physician. One significant unknown factor is how debilitated the patient will become over a long period following a knee injury. While some patients find loss of a cruciate ligament to be quite disabling, other patients may cope well with such an injury. Many patients, therefore, might benefit from some type of procedure that would address ligament injury while not requiring extensive reconstruction.

The Healing Response procedure is a minimally invasive technique developed by Dr. Steadman as an alternative to a full formal anterior cruciate ligament (ACL) reconstruction. This technique is most applicable when the ACL is torn near the femur—an injury common in alpine skiing—as opposed to its mid-substance. Use of this technique also must include consideration of the patient's lifestyle, demands and expectations.

The procedure is performed arthroscopically and involves making several microfracture holes at the femoral attachment of the ACL and numerous perforations in the injured ligament itself. The surgically induced marrow clot ("super clot"), which forms after the bone perforations, captures the ends of the damaged ligament and provides an environment rich in healing proteins and regenerative cells. The ends of the torn ligament then reunite with the femur without need for any other type of fixation (i.e., sutures, staples, stents).

The latest research on Healing Response has revealed the existence of two healing proteins. The following sequence of events takes place at the cellular level: On Day 1, there is an increase in healing protein TGF-β1. This is explained by the hemorrhaging that occurs at the microfracture sites and within

(Continued on page 8)

(HEALING RESPONSE cont. from pg 7)

the ligament, since TGF- β 1 is derived from ruptured platelets and disrupted blood vessels. On Days 4 through 7, as the "super clot" consolidates, there is a decrease in TGF- β 1 levels. This corresponds to the decrease in hemorrhaging.

There is also formation of new blood vessels and fibrin strands. Regenerative cells are present and there is an initial influx of new ligament cells into the clot and ligament. By Day 7, organized strands of fibrin have exited the microfracture holes and actually spanned the gap from the bone to the ligament. Regenerative cells are abundant throughout, and there is less evidence of hemorrhage with a marked increase in new ligament cells in both the "super clot" and the ligament.

The increase in regenerative cells on Days 4 through 7 correlates directly with increased IGF-1 (another healing protein) since IGF-1 likely originates from the new tendon and ligament cells. Thus, the "super clot" resulting from the Healing Response procedure provides an enhanced intra-articular environment that is conducive to normal ligament healing.

This study further confirms the scientific credence of the Healing Response procedure and helps explain why it works successfully in many patients. It clearly is an alternative to a full formal ACL reconstruction.

Knee Injuries and the White Circus ACL Reconstructions Bring Ski Racers Back to Top Form

by **Andrea M. Saterbak, M.D.** and **J. Richard Steadman, M.D.**

Editor's Note: Dr. Saterbak, who authored this article, completed her medical training in Vail in the Steadman♦Hawkins Sports Medicine Foundation's Fellowship Program in 1998. Presently, she is a practicing surgeon at St. Croix Orthopedics in Stillwater, Minnesota.

Dr. Saterbak was a member of the U.S. Developmental Alpine Ski Team in 1979 and was a nationally ranked competitor. She was on the NCAA Championship Ski Team from the University of Wyoming and was named an NCAA Academic All-American in 1987 and 1988.

Few sports medicine doctors have been known to have a long-standing history with a nationally governed sports team. Dr. Steadman has developed a special interest with the athletes on the U.S. Ski Team since the early 1970s and his generosity to the team is well-known. Racing at the elite level in the early 1980s, I was aware of the lure of an injured athlete to his small office at Barton Memorial Hospital in Lake Tahoe. Athletes knew they were in good hands. Later in my orthopaedic education, I became aware of the limited information regarding the performance of an elite alpine ski racer after sustaining an injury to the anterior cruciate ligament (ACL). As a 1997-98 Fellow, I dug into the U.S. Ski Team roster and developed a database with the goal of identifying the incidence of ACL injuries and learning how these athletes performed after contemporary techniques of ACL reconstruction.



Dr. Steadman reconstructed the ACL of Tommy Moe, U. S. Ski Team member and 1994 Olympic Gold Medalist in downhill.

(PHOTO COURTESY OF JOHN KELLY)

In 1998, with the help of the Steadman♦Hawkins Sports Medicine Foundation, I generated a database of athletes racing at the World Cup level (some at the Europa Cup level) between 1985 and 1995. More than 141 athletes were identified and 101 of these athletes were located for follow-up. After asking them to complete a questionnaire, I targeted 41 athletes who sustained an ACL injury. Associated injury to the medial collateral ligament, reported in 35 percent of the cases, was common. Meniscal injury also was common, seen in 61 percent, with the lateral meniscus most often afflicted. Injury to the posterior cruciate ligament was observed in two athletes.

Follow-up was obtained in 32 of 41 athletes who underwent ACL reconstruction. This included two athletes with injuries to both knees. Twenty-nine of 34 knees had undergone ACL reconstruction with a patellar tendon graft by Dr. Steadman. The remaining five athletes, three of whom were reconstructed with patellar tendon grafts and two of whom were reconstructed with hamstring grafts, were treated by other surgeons. Subjective and objective clinical measures were tabulated and we found that the average KT-1000 at 39 months post-surgery was 2.3mm.

The KT-1000 is a device that, when applied to the knee, can help us determine forward movement of the knee before and after ACL reconstruction. Studies have shown that if a surgeon can limit the movement to 3mm or less (when compared to the individual's other knee), knee function and stability is assured.

These athletes said they were at their pre-injury competition level by 17 months. Four athletes retired after their injury, and two admitted retirement was contemplated prior to the injury. Four athletes won Olympic medals, three won World Cup races and four won medals at the U.S. National Championships following surgery. Thirty-three of 34 grafts survived, with one athlete sustaining a re-rupture of his graft after falling in a downhill race. Subsequent arthroscopic surgery was required in 11 athletes, primarily for a small debridement of adhesions, two of whom had additional meniscus tears.

Statistical analysis revealed that a woman ski racer who participated in the technical events may be more at risk for an ACL injury. However, when considered as separate variables, gender and specialty were not significant risk factors in and of themselves.

Finally, the good news is that this retrospective analysis of elite alpine ski racers provides strong support for a successful return to the elite levels of ski racing after a major injury to the knee requiring ACL reconstruction. ■

(WEIGHT-BEARING EXERCISE cont. from pg 1)

sensation which I found very abnormal for me on skis.

The first hooking incident occurred while turning left, when I felt myself simply losing balance, coming down on my buttocks. Quickly getting up, I thought, "This is a real surprise I *never* fall like that. And yet, I also didn't feel I had anything to worry about, saying to myself, 'I'll just ski to the bottom, then check my skis' edges.'

My skiing buddies, all experts, had been skiing for an hour or so when they joined me at a spot where we had planned to meet on the hill. I had just arrived from the city and was about 10 minutes late. Not wanting to delay them any further, I failed to check the ski shop's work on my skis, as I normally would have done after having someone else sharpen them. Usually, I dull the first four to five inches and final five inches on each ski with a flat stone in order to prevent the very kind of hooking problems I would soon experience.

We had ridden the lift up, talking about how the snow was on this bright but icy morning. A couple of my new acquaintances were French, and one of them had been a member of the French Olympic movement when Killy won his three gold medals. I was looking forward to skiing with them. "Conditions today not too difficult," they had assured me, as we exited the lift in good spirits and proceeded to ski on a crossover trail. So how did I lose an edge and my balance so easily? I reconstructed the event in my head, determining that my skis had just hooked on me and I had caught an inside edge. With that, I dismissed my self-criticism, kicking myself mentally that I had not checked my edges before skiing.

Then, after entering the trail we had selected to ski, I found myself repeating my earlier fall. While turning to the left, my tips hooked again and I went down in the same way. This time, however, I felt a searing pain in my left hip as I struck the hard snow with a good impact. Right then, I knew instantly I had done something which was not going to allow me to get up on my own. A patroller arrived, summoned a toboggan and whisked me down to the area first-aid station.

Everything was quickly done by radio and within an hour I had been x-rayed, was confirmed as having a broken hip, and waited for a helicopter to fly in from Albany to return me to New York where Dr. Thomas Sculco would operate to pin my hip the next day at The Hospital for Special Surgery. My skis' tips, which I checked when I got out of the hospital seven days later, had not been dulled by the shop and the tails had also been left sharp, so my suspicions were finally confirmed.

Today, some ten months later, I'm doing fine, expecting to ski this winter and to be fully recovered by next spring. But in the non-stop interim I've learned a few things which I would like to pass along to perhaps keep others from the same fate. The physical therapists at The Hospital for Special Surgery and, later, at HealthSouth in New York, have provided me with some valuable knowledge on weight-bearing exercises that I had not been familiar with, since I had been a healthy skier who seldom fell.

What the therapists told me was powerfully reinforced in late October when I happened to click onto the website of the Steadman◆

Hawkins Sports Medicine Foundation. Dr. Steadman, the founder of the Foundation, has surrounded himself with some of the best talent in medical therapy. Two of these well-trained specialists, John Atkins and Topper Hagerman, collaborated with Dr. Steadman in co-authoring an article in *Newsweek* in October 1999. In it, they laid out the mission of U.S. sports medicine for the millennium: Get the nation off its fatty assets.

Decrying our growing sedentary lifestyle, which results in a wide range of diseases and orthopaedic problems, Dr. Steadman and his colleagues gave us one cure for the couch potato syndrome that afflicts more and more Americans each day. That is, simply develop a personal program of weight-bearing exercises. In other words, the keys to athletic fitness are obtainable to each and every one of us by adopting a weight-bearing exercise program.

Perhaps my hip would not have broken had I given myself to such a program more completely prior to last March. I have altered my course since then, not only by taking on a daily program of simple exercise, but by having my bone density checked to establish a base level and, using the results of this check, adding a medically approved fosamax prescription to my daily vitamin regimen—an addition which includes 1000 mg of calcium citrate with balancing magnesium and Vitamin D.

What exactly is weight-bearing exercise? It is simply bearing your own weight to transport yourself and, if you can, using additional weight to tone muscle strength and ability. Accomplishing a series of tasks by employing weight-bearing activities is all that is needed in a program which could include walking, jogging, hiking, dancing, aerobics (like bicycling), alpine skiing, snowboarding or cross-country skiing (considered the No. 1 weight-bearing-exercise activity).

Creating resistance simply by using the body's own weight and sometimes adding additional weights, such as those provided by gymnasium equipment or portable home devices that allow a range of motion, increases our ability to perform various movements. Results begin immediately, leading to stronger and healthier bodies and an uncanny sense of satisfying our very important emotional needs to look and feel better.

Does it take a lot of time from our busy lives? No. The *Newsweek* article allows that we can begin such a program to stay aerobically active by taking only three short walks a day and performing what Dr. Steadman and his colleagues call "mini squats" (three sets of eight double knee dips), enough to begin building strength in the legs and joint flexibility. Resistance devices such as elastic cords will provide doable additional exercises with programmed schedules that fill the bill.

Thankfully, the authors of the *Newsweek* article insist the old adage "No Pain, No Gain" is passé. Instead, they tell us their weight-bearing exercise rule is, "If it hurts, you're doing it wrong."

(Continued on page 10)

**THE BENEFITS OF A
WEIGHT BEARING
EXERCISE PROGRAM ARE
DEMONSTRATED IN 3
AREAS: 1) IMPROVED
BONE DENSITY, 2) BETTER
CIRCULATION, AND 3)
RENEWAL OF AEROBIC
HEALTH.**

(WEIGHT-BEARING EXERCISE cont. from pg 9)

World Cup skiers have used resistance cords for years because they are so portable, easy to use and have demonstrated proven results. Ski team successes in maximizing strength and mobility with the resistance cords have brought much acclaim by a growing legion of fitness advocates. The flip side of the fitness coin—physical therapy to speed restoration of power and ability after injury—is even more dramatic proof that the resistance cords work. Ever since World Cup star Marc Girardelli recovered so completely from his debilitating knee injury a few years back, we have known the benefits of elastic resistance cords. Using resistance training, and with an indomitable desire to regain every bit of the strength and mobility he had lost from an otherwise career-ending injury, Girardelli not only restored his race-winning form but trained his injured knee to become even stronger than his uninjured one, a feat that allowed Girardelli to keep his name in the ski racing headlines when a year earlier his career was thought to be history. Word-of-mouth from Girardelli's success quickly spread to other athletic professionals. Soon a deluge of resistance-cord activity from pros of all stripes resulted in the device being quickly approved by NBA and NFL teams, whose coaches today advocate resistance cord training for all their players, knowing the simple light-weight exercise devices can turn a hotel room into a private gymnasium.

Finally, let me leave you with this borrowed tip from Bill Phillips' book *Body for Life*: Always rest for a full minute between sets of whatever exercise you choose to do. This 60-second break is like a vacation after each set and is something you can look forward to. When a minute has passed, you'll be totally ready for the next set, knowing another 'vacation' awaits after that.

Conditioning and Maintenance with Four Simple Resistance Cord Exercises

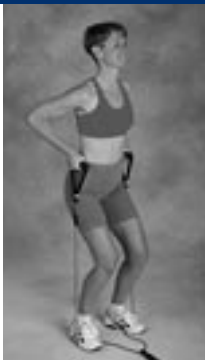
Improve the Quality of Your Life with Resistance Exercise

Basic Exercise Guidelines:

- Aerobic exercise should be performed 3-4 days per week, with rest days in between. Begin with 10-15 minute sessions and build to about 30 minutes per session.
- Resistance exercise should be performed 2-3 days per week, also with a day rest in between. Doing 2-3 sets of 10-15 repetitions of each exercise is recommended.
- Consult your physician before beginning any exercise program.

Knee Exercises

These resistance cord exercises will work the muscles of the knee and lower leg.



Double (One-Third) Knee Bends How To Do It: Stand on the cord with both feet 12-20 inches from the handles. While not standing close to the handles, pull the handles to your waist. Slowly lower your body to a one-third knee bend. Repeat. Do not fully extend when returning to starting position. For advanced exercise, add more repetitions. Do *not* increase cord tension.

Ski Dip How To Do It: Place the right hand on a chair or desk (use only 2 or 3 fingers for balance and do not lean or place weight on this hand or arm). Bring the right leg behind and off the ground toward your buttocks. Keep your head up, back straight and your left knee slightly flexed.

Next, slowly lower your body 4 or 5 inches.

Don't allow the knee to travel too far in front of the left foot and don't bow at the waist. Return to the start position without fully extending the leg. The cadence should be one second down and one second up. Alternate legs.

When you start, lower the body only 2 or 3 inches and work until you can reach 5 inches. Begin with three sets of 20-30 repetitions and work toward three minutes (nonstop) on each leg. This exercise is excellent for muscle endurance as it works all the leg muscles and gluteals (butt muscles).

Upper Body Exercises

These exercises will work the muscles of the upper body.

Chest Flys How To Do It: Attach the cord to a door at mid-level using the door knob attachment. Facing away from the door, stand in a stride position with one foot in front of the other. Arms should be outstretched to the side (elbows slightly flexed), forward of parallel, with hands in a line of vision.

Slowly bring the handles together. It is important to maintain a straight back position and to provide slow resistance on the return. Repeat the exercise.

Upright Rowing How to do it: While standing with feet together on the cord, grasp both handles with both hands at waist level. Handles should be positioned so that they are flat to the chest and not pointing out. Pull the handles toward your chin. Slowly return to starting position. Repeat exercise.

CAUTION: Stand firmly on the resistance cord while it is under tension so the cord does not slip loose. ■

For further information on resistance cords and weight-bearing exercises, contact Toppersportsmedicine, P.O. Box 260500, Highlands Ranch, CO 80163, (800) 250-3779, www.toppersportsmedicine.com

(RESEARCH UPDATE cont. from pg 1)

ditions through injury, previous surgeries or simply through the course of time.

If this line passes through the inner half of the knee, we can get into a tough cycle. Perhaps as much as 60 percent of our weight now falls on the inner side of the knee and 40 percent on the outside. As the inner side of the knee starts to collapse, the line shifts over even further, putting more weight on the inner side—and this situation becomes much more progressive. By putting more and more pressure on the inside of the joint, we start wearing down the cartilage in that area.

The cartilage is the cap of low-friction paint covering the end of the bone. This is a smooth shiny substance that we see on the end of a chicken bone, for example. Once this is worn down, we are then down to a bare bone-on-bone condition called arthritis. Osteoarthritis is the wear-and-tear phenomenon resulting in arthritis. Our joints are no different than most other mechanical devices in that they will wear out with time depending upon the amount of use. Obviously, if we put more use on one side of the joint vs. the other, that side will wear out more quickly.

Our treatment options for a patient who has increased bowing of the leg along with arthritis on the inner side of the knee have improved dramatically over the course of the last seven years. Previously, patients had always been told, "Just wait until it's bad enough, then have a joint replacement." We now have a treatment plan for this problem.

Typically, we would start off with some of the nutritional supplements, such as glucosamine, which seem to be doing a good job for the majority of—although not all—patients. Keeping the best padded insole in our shoes helps to cushion the joint. Keeping the quadriceps and hamstring as strong as possible will re-distribute more of the pressure on the muscles than the bony architecture of the joint. When these steps do not seem to help enough, braces are available that can lessen the load on the inner side of the knee. Additionally, patients may find relief with anti-inflammatory medicines. I am not a fan of long-term pill usage, but on an intermittent basis for three to four weeks at a time, anti-inflammatory medication seems to break the cycle of inflammation.

Certainly, some of the newer treatments, such as Hylagan or Synvisc, which are injected directly into the knee, seem to provide pain relief comparable to high-dosage anti-inflammatory medicines, with the further benefit that these injections last up to a year.

When we consider surgical options for this type of problem, Dr. Steadman and the Foundation have developed the chondral resurfacing procedure we commonly refer to as "microfracture." This surgical procedure involves making small punctures in the bone that underlies the damaged cartilage. These small punctures, or microfractures, provide access to the cells and healing factors contained in the bone marrow. These marrow elements are released and form a "super clot" which supports formation of new fibrocartilage. Microfracture can do an excellent job of resurfacing the joint and "repainting" the end of the bone with this cartilage. Unfortunately, if the joint is out of alignment and the majority of the weight is put on the side that needs to be resurfaced, this will wear down much faster. Therefore, instead of lasting seven to nine years, it might last no more than three to four years,



Weight-bearing line connecting the hip to the ankle demonstrating that most of the weight in a bow-legged knee is going through the inner half of the knee.



A preoperative x-ray demonstrating bone-on-bone deformity on the inner side of the left knee.



X-ray at eight-weeks postoperatively after correcting the alignment.

although these numbers can vary depending on the individual's anatomy. The obvious next step, then, is to realign the joint and turn a bowlegged stance into either a straight or even knocked-kneed stance.

Historically, previous techniques have been somewhat complicated, with varying results. Older procedures involved removing a wedge of bone from the outside portion of the leg to realign the joint.

This technique was a limited "one shot" approach and would often shorten an already shortened leg.

Over the last five to seven years, we have worked to realign the joint from the inner (medial) side—where the problem exists. This is much more accurate and restores length to the shortened leg. While historically the result of a high-tibial osteotomy (realignment) adds an average of approximately nine years to the life of the knee, we hope that by adding a chondral resurfacing procedure this will produce even greater improvement.

Conversely, in the right circumstances, adding an osteotomy procedure to a microfracture will help "protect" this new joint surface for an even longer period. The results of this new "opening wedge

osteotomy" have been increasingly encouraging—to the point where we can now predictably realign the knee and resurface the joint in an attempt to put off the need for a knee replacement for an indefinite period of time.

Our options for the joint realignment portion include an internal device, which would require patients to be non-weight-bearing for a minimum of eight weeks, or an external device, which would allow patients to bear weight somewhat sooner but is much more cumbersome and a little less user-friendly. Both of these options should be discussed extensively before embarking on either.

It is an exciting and encouraging time in medicine for joint preservation, and this is an encouraging step. Anything we can do to put off the need for knee replacement and keep people actively doing the things they want to do for as long as they possibly can is going to be best for the person as a whole and should not be considered merely a "knee solution." ■

The Steadman◆Hawkins Sports Medicine Foundation is dedicated to keeping people of all ages physically active through orthopaedic research and education in the areas of arthritis, healing, rehabilitation and injury prevention.

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December 6-9, 2000.

Tenth annual Steadman◆Hawkins Sports Medicine Foundation Fellows meeting, Vail, Colorado. Call Holly Horvath, (970) 479-5788 for more information.

January 19-21, 2001

Fourth Annual Steadman◆Hawkins All-Star Classic Ski Celebration. Beaver Creek, Colorado. Ski with Steadman Hawkins Olympic and World Champion Alumni. Call Rachel Lenz, (970) 479-5786 for more information.

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