

PATIENTS IN THE NEWS:

Dave Wyman and Scott Cauchois: A Tale of Two Athletes

Editor's Note: The following profiles are based on interviews by Dick Needham. Mr. Needham is Editor of the skier newsletter "Inside Tracks" and Senior Contributing Editor of "Ski Magazine".

Some athletes have seen their best days. Others are experiencing their best days. And when competing at the highest levels, the potential for injury has always been — and always will be — there.

Former pro linebacker Dave Wyman suffered a knee-ripping, blind-side cut while an All-American playing with John Elway at Stanford University. It was severe, leading Stanford doctors to wonder if he would ever walk, let alone play, again. Thanks to Dr. Richard Steadman and his team at Steadman-Hawkins, Wyman went on to star with the Seattle Seahawks and Denver Broncos, playing once again with his old pal and teammate John Elway. But there were nine knee surgeries along the way.

Scott Cauchois, who went to the University of Berkeley (Calif.) on a soccer scholarship, joined an indoor soccer league after graduation and tore his ACL on artificial turf, suffering not only significant cartilage damage but injury to his femur as well. Prognosis: Future sports participation doubtful. He, too, headed for Dr. Steadman.

Though it would be a stretch to consider soccer and football the same fields of endeavor, the common denominator in this case was a new surgery called microfracture. Pioneered by Dr. Steadman in the mid-Eighties, microfracture involves the use of an arthroscopic shaver to remove cartilage remnants and surgical awls to make perforations through the subchondral bone plate, thus allowing access to stem cells and promoting important healing factors.

(Continued on page 11)

SPORTS AND WELLNESS: Spring Back

By J. Richard Steadman, M.D., Julie Frank, M.S., P.T. and Sean McEnroe, P.T. and the staff of the Howard Head Sports Medicine Centers.



PHOTO COURTESY OF JOHN KELLY.

Until it hurts, most of us don't think much about our backs. However, by middle age, almost everyone has experienced some form of back pain. Health care costs related to back pain exceed \$25 billion annually in the U.S. alone — and most of this money is spent on treatment, rather than prevention.

It's time to take charge of your life with a fresh look at preventing back injuries, rather than facing the pain and frustration of treating the problem after it occurs. Even if you already

(Continued on page 8)

STEADMAN HAWKINS RESEARCH UPDATE

Shoulder Injuries: Surgery or Rehab?

Oratec Heat Probe Found to Correct Shoulder Instability

By Richard J. Hawkins, M.D.

The shoulder joint has the greatest range of motion of all joints in the body. Despite the circle of stabilizing tissue around the shoulder joint, the

extreme range of motion that the shoulder can perform predisposes it to be the most unstable joint in the body. The glenohumeral joint consists of a large humeral head that rotates on a small, shallow glenoid. A circle of stabilizing tissues that consist of capsular ligaments, rotator cuff tendons and muscles surrounds the shoulder joint. Capsule laxity is present to varying degrees in the normal shoulder and is needed for normal range of motion. Shoulder instability is a condition where the shoulder comes out of the joint and

(Continued on page 7)

IN THIS ISSUE

International Cartilage
Symposium In Vail

Kirsch Foundation Supports
New Website: www.shsmf.org

NFL Charities
To Fund Research

Knee Brace Provides
Stability For ACL Injuries

TOPPER HAGERMAN JOINS FOUNDATION AS COO

Former Director of U.S. Olympic Sports Physiology Labs to Head Day-to-Day Operations

Topper Hagerman, Ph.D., sports medicine consultant to the Steadman-Hawkins Sports Medicine Foundation and Steadman-Hawkins Clinic has been named Chief Operating Officer of the Foundation. Dr. Hagerman joined Dr. Steadman in South Lake Tahoe, Calif. in 1984 to help develop fitness and rehabilitation protocol for Dr. Steadman's patients.



Foundation COO
Topper Hagerman, Ph.D.

From 1982 to 1984 he was sports physiologist and trainer for the U.S. Men's Alpine Ski Team and the gold-medal-winning 1984 U.S. Olympic Alpine Ski Team. Between 1977 and 1982, he headed up the Sports Physiology Labs at the U.S. Olympic Training Centers in Colorado Springs and Squaw Valley, Calif. He began his career as an assistant professor of Sports Science at Syracuse University.

Said Dr. Steadman, "Topper brings a unique blend of research and practical application to the Foundation with his background in conditioning and rehabilitation. He has tested, coached and designed conditioning and rehabilitation programs for more elite athletes in this country than anyone I know. One of his greatest strengths is in building project-based teams and getting people to work toward a common goal. As an exercise physiologist, he understands the research process. Topper also knows the staff and has been an integral part of the Foundation since its beginning in 1988."

Said Dr. Hagerman, "I have seen the Foundation grow from one employee in South Lake Tahoe to nearly 20 full-time employees today. This represents tremendous growth and shows just how important the Foundation has been to the Steadman-Hawkins Dream."

A graduate of the University of Wisconsin-LaCrosse, Topper received his B.S. Degree in 1968. In 1974, he received his M.A. and in 1976 his Ph.D. from Ohio State University. He is widely published in medical and sports medicine literature and has authored a series of four books for Bantam: *Efficiency Cycling*, *Racquet Sports*, *Swimming*, and *Walk-Jog*. ■

Drs. Sabick and Shelburne Join Biomechanics Laboratory

Michelle Sabick, Ph.D., and Kevin B. Shelburne, Ph.D., have been named senior staff scientists in the Foundation's Biomechanics Research Laboratory. Dr. Sabick will focus her research on upper-extremity mechanics, rehabilitation and computer modeling. Dr. Shelburne will focus his engineering talents on creating and improving both upper- and lower-extremity computer models.

Dr. Sabick graduated summa cum laude from Case Western Reserve University in 1992. She earned a B.S. degree in biomedical engineering, with a specialty in biomechanics, later pursuing graduate studies in biomechanics at the University of Iowa. In 1994, Dr. Sabick received her MS degree in biomedical engineering, with specialties in sports biomechanics and geriatric engineering. In 1996, she led a student design team that won first place in the United States Olympic Committee's Sport Science and Technology Design Contest. She completed her Ph.D. in biomedical engineering with a specialty in biomechanics at The University of Iowa in 1997. Her thesis was entitled "The Effects of Fall Direction and Protective Responses on the Likelihood of Hip Fracture in Falls."

Dr. Sabick was awarded a National Research Service Award Post-Doctoral Fellowship to conduct research at the Orthopedic Biomechanics Laboratory at the Mayo Clinic in Rochester, Minn. Her research there included studies of upper-extremity biomechanics in wheelchair propulsion, muscle activation in golfers, and wrist-ligament functions.

Dr. Shelburne received his B.S. degree in mechanical engineering from Texas A&M University in 1985. He was awarded his M.S. in mechanical engineering in 1988 from Texas A&M, where he specialized in robotics. Before returning to graduate study at the University of Texas at Austin, Dr. Shelburne spent three years working on the International

Space Station project at McDonnell Douglas Space Systems. In 1997, he received his Ph.D. in mechanical engineering from the University of Texas, specializing in biomechanics. His work focused on computer modeling and the simulation



Drs. Shelburne, Sabick and Biomechanics Research Laboratory Director Dr. Michael Torry.

of human mechanics for the design of joint replacements, surgical procedures and rehabilitation protocols.

Prior to joining the Foundation, Dr. Shelburne was senior engineer for Lockheed Martin Astronautics, in Denver, Colo., and was responsible for design and analysis of structures and mechanisms for NASA's new launch-vehicle development.

Foundation to Host International Cartilage Symposium

The first International Cartilage Symposium in Vail, Colorado scheduled for August 18th-19th, 2000, will be hosted by the Steadman♦Hawkins Sports Medicine Foundation and the Steadman Hawkins Clinic. The three-day meeting will feature a world-renowned, international faculty of orthopaedic surgeons, each of whom has pioneered innovative procedures for treating articular cartilage injuries.

Co-chairs of the event are Dr. J. Richard Steadman, founder of the Steadman♦Hawkins Sports Medicine Foundation and principal of the Vail-based Steadman Hawkins Clinic, and Dr. Martin Boublik, principal of the Steadman-Hawkins Clinic's Denver office. The two-day meeting for practicing orthopaedic surgeons will include academic sessions and cadaver laboratory demonstrations.

Confirmed symposium faculty includes:

- Dr. J. Richard Steadman, who will present a lecture/demonstration on microfracture, a surgical procedure he has developed that recruits stem cells from bone marrow to form new cartilage over areas in the joint where bare bone is exposed.
- Dr. Lars Peterson from Sweden, who will demonstrate autologous chondrocyte transplantation, a two-stage procedure where cartilage cells are collected from a patient's knee, grown outside of the body in a laboratory, and re-implanted into the knee joint surface defect.
- Dr. Vladimir Bobic of the United Kingdom and Dr. Laszlo Hangody of Hungary, who will present their experience with osteochondral autograft transfer (OATS) and mosaicplasty. With these procedures, pieces of cartilage and bone are removed from a non weight-bearing area of the knee and transplanted to a weight-bearing surface, to fill in where the cartilage has worn away.
- Dr. Allan Gross from Toronto, Canada, who will present his experience with allografting of chondral defects. In this procedure, large segments of bone and cartilage are removed from a donor cadaver knee, and implanted into a usually large defect.
- Dr. Christoph Saager, Aarberg, Switzerland, will present the soft delivery system for osteochondral transplantation.
- Dr. Richard J. Hawkins from Vail, Colorado, who will discuss joint surface injuries in the shoulder.
- Dr. Charles Ho from San Francisco, who will present MRI techniques for visually analyzing articular cartilage.

With growing worldwide interest and concern over the increase in degenerative arthritis, this seminar will be timely and relevant to both the orthopaedic world and lay community. The meeting will be limited to 125 participants. Registration will be on a first come, first served basis.

The First International Cartilage Symposium is supported by an unrestricted educational grant from Pharmacia Corporation and Pfizer Inc.

Pharmacia Corporation is a leading global pharmaceutical company created through the merger of Pharmacia & Upjohn with Monsanto Company and its G.D. Searle unit. Pharmacia has a broad product portfolio, a robust pipeline of new medicines, and an annual investment of more than \$2 billion in pharmaceutical research and development.

Pfizer Inc is a research-based global pharmaceutical company that discovers, develops, manufactures and markets innovative medicines for humans and animals. The company reported revenues of more than \$16 billion in 1999 and spent more than \$3.2 billion on research and development.

For further information, please contact Holly Horvath, education coordinator for the Steadman♦Hawkins Sports Medicine Foundation at (970) 479-5788. ■

STEADMAN-HAWKINS NAMED COLORADO ROCKIES' TEAM PHYSICIANS

Foundation Research to Play Key Role

Major League Baseball's Colorado Rockies announced in December that Dr. Richard J. Hawkins, Dr. J. Richard Steadman, and former Steadman-Hawkins Fellow and new associate Dr. Michael J. Curtin will serve as the Club's new orthopaedic and sports medicine team. "The addition of these world-renowned surgeons to our team is a crucial component of our overall plan," said Rockies Executive Vice President Dan O'Dowd. "One of our goals was to ensure the possibility of having one of the finest medical teams in all of baseball in creating a year-round

medical program for our players."

Steadman-Hawkins also provides the medical care for the Denver Broncos, the U.S. Ski Team, the U.S. Disabled Ski Team, and Eagle County High School athletic programs. Not only do these programs have leading-edge medical care, but they



1997 National League MVP Larry Walker and Rockies Team Physician Dr. Richard Hawkins at Spring Training.

PHOTO COURTESY KAREN MELHART.

also have the research support of the Steadman♦Hawkins Sports Medicine Foundation.

For the past two years, the Foundation's upper-extremity research group has been building an extensive data base on major-league baseball pitchers' throwing motion with the objective of identifying correct biomechanics. This information will not only benefit the Colorado Rockies, but will provide important knowledge on injury prevention to coaches, physicians and trainers of collegiate, recreational and Little League players.

NFL GRANT TO FUND OSTEOARTHRITIC/ORTHOPAEDIC RESEARCH

For the eighth consecutive year, NFL Charities, the charitable foundation of the National Football League, has awarded a substantial research grant to the Steadman-Hawkins Sports Medicine Foundation for new and continuing work in orthopaedic rehabilitation and the causes and treatments for sports-related osteoarthritic injury. This year's \$137,000 commitment to medical research by the Foundation is part of the NFL's continuing commitment to its athletes and to the public-at-large.

The grant will be used to fund several important research areas, according to Foundation CEO Dr. Charles Dillman. One study will focus on tissue engineering and the biological resurfacing of large cartilage defects, the kind that create career-ending knee injuries for athletes and impacts on activity for people in general.

"So far," says Dr. Dillman, "we have concluded that our microfracture technique produces significantly superior outcomes in the knee, compared to standard surgical debridement techniques. This second phase of our work will refine the microfracture technique even further to enhance the treatment of degenerative arthritis. This multi-year study's dual purpose is to better understand the reasons for cartilage degeneration and the best way to re-establish joint surface integrity."

The three-part study, partially funded by the NFL grant, will establish the composition, function and durability of the tissue that develops following microfracture vs. conventional surgical debridement. It will also examine the effect of growth factors added to the microfracture procedure, and determine which factors should be used at what point in time. Finally, it will allow the Foundation to explore and evaluate the value of adding transplanted cells taken from elsewhere in the joint.

The NFL grant will also partially fund a second study comparing ACL surgical reconstruction techniques and their effect on gait adaptations in ACL-injured athletes. This study will attempt to differentiate among different surgical techniques used on ACL patients and the relationship of the technique and the patients' compensation in gait change while walking or running. The study's long-term goal is to better define optimal surgical techniques and identify the best rehabilitation procedures following ACL surgery to help patients avoid further injury and promote more rapid and complete healing.

A third study, also to be partially funded by the NFL grant, will attempt to quantify the value of a functional knee brace in ACL-deficient, normal and ACL-reconstructed knee patients. ■

NIPPON SIGMAX LAUNCHES PHYSICIAN VISITATION PROGRAM

Nippon Sigmax Co., Ltd., a worldwide manufacturer and distributor of orthopaedic and sports medicine products, organized a two-day visit in January to the Foundation and Steadman-Hawkins Clinic in Vail for four prominent Japanese orthopaedic surgeons. The busy two-day schedule included academic sessions with Drs. Steadman, Hawkins, Sterett and Fellowship physicians, and observation of new surgical procedures being developed by the Foundation. The physicians observed live microfracture and high-tibial osteotomy operations and the use of the radio-frequency heat probe to correct shoulder instability.

The visiting doctors included chief surgeon Dr. Eiji Uchiyama and assistant surgeon Dr. Hiroshi Iwaso from Kanto Hospital; Chief surgeon Dr. Shigeru Hioki of Kinu Ishikai Hospital, Orthopaedic Division; and Dr. Atsuto Hoshikawa of the Tokyo University Hospital, Sports Medicine Division.

John Atkins, President of the Howard Head Sports Medicine Centers, gave a presentation on rehabilitation, and Dr. Mike Torry, director of the Biomechanics Research Laboratory, presented an overview of Foundation research.

Jimmy Takada, director of the International Division for Nippon Sigmax, was pleased with this first visit, saying, "The visitation program will become one of our main educational support strategies this year."

Nippon Sigmax, a corporate partner of the Foundation, is based in Tokyo with subsidiaries in Korea and California. ■



Dr. Hawkins, center, demonstrates use of radio-frequency Heat Probe to Japanese physicians.

PHOTO COURTESY KAREN MELHART.

STEADMAN-HAWKINS UPDATE: Publications, Presentations, and Research

Annual Meeting of the American Academy of Orthopaedic Surgeons:

The 67th Annual Meeting of the American Academy of Orthopaedic Surgeons (AAOS), representing more than 17,000 orthopaedic surgeons, was held March 15-19 in Orlando, Florida. The Foundation was well represented in reporting research results, providing instruction, and producing teaching videos. Nine presentations were made by Foundation principals at this meeting.

Academy Highlights:

Dr. J. Richard Steadman participated in a symposium covering progressive physical training: *How to Monitor and Guide the Pace of Physical Retraining*.

Dr. Richard J. Hawkins presented several papers and poster exhibits: *Tenodesis Versus Release in the Treatment of Pathology of the Long Head of the Biceps Brachii*. Co-authors of this paper included former Steadman-Hawkins Fellows Thomas J. Gill, M.D., Scott D. Mair, M.D., and Elizabeth McIrvine; *Ulnar Neuropathy in the Throwing Athlete: Quantitative Analysis of Ulnar Strain with Clinical Correlation*. Former Steadman-Hawkins Fellow Kevin D. Plancher, M.D. was a co-author.

Tricia Murray joined Dr. Hawkins, Thomas J. Gill, M.D. and Scott D. Mair, M.D., in presenting two posters: *Injury Prevention in the Throwing Athlete: A Biomechanical Study*; and *Biomechanics of the Elbow in Throwing: Relationship to Injury Production and Prevention*.

Michael Decker, M.S. presented *Landing Performance in ACL-Reconstructed Recreational Athletes*. Co-authors included Michael Torry, Ph.D., Dr. William I. Sterett, and former Steadman-Hawkins Fellow Tom Noonan, M.D.

Dr. William Rodkey, the Foundation's director of Basic Science Research, gave instruction on *Arthroscopic Meniscus Repair*.

Steadman-Hawkins Fellow Mininder S. Kocher, M.D., presented two papers: *Differentiating Between Septic Arthritis and Transient Synovitis of the Hip in Children: An Evidence-Based Clinical Prediction Algorithm* and *Partial Tears of the Anterior Cruciate Ligament in Children and Adolescents*.

Forty-three teaching videos were presented at the Academy, seven of which were produced by the Steadman-Hawkins Sports Medicine Foundation. One video, in particular, *Arthroscopic Bankart Repair with Heat Probe Capsulorrhaphy*, by Michael J. Curtin, M.D., and Richard J. Hawkins, M.D., was an award winner. Congratulations to Drs. Hawkins and Curtin, and Karen Melhart and George Peirce of the Foundation's Video Service Department.

Specialty Day At The American Orthopaedic Society For Sports Medicine

The Foundation was also well represented during the American Orthopaedic Society for Sports Medicine (AOSSM) Specialty Day, March 18. **Dr. Hawkins** was a discussion leader for the Scientific Session: *Physical Examination, The Predictive Value of 23 Clinical Tests for Rotator Cuff Pathology* along with co-authors Dr. Thomas J. Noonan and Karen Briggs, M.B.A., director of Clinical Research for the Foundation. Dr. Hawkins presented *Outcomes of Shoulder Instability Treated with Laser Thermal Capsulorrhaphy*. Also presenting during the AOSSM Specialty Day was **Mike Decker, M.S.**: *Landing Performance in ACL-Reconstructed Recreational Athletes*.

Karen Briggs, M.B.A., director of Clinical Research, reports that three abstracts have been accepted for presentation to the **American Orthopaedic Society for Sports Medicine** annual meeting in June at Sun Valley, Idaho: *Shoulder Capsule Volumetric Change After Open Inferior Capsular Shift Vs. Thermal Capsulorrhaphy: A Cadaveric Model*, Aron D. Rovner, M.D., Timothy A. Luke, M.D., Spero G. Karas, M.D., Kevin D. Plancher, M.D., M.S., and Richard J. Hawkins, M.D.; *Electrothermal*

Arthroscopic Shoulder Capsulorrhaphy: A Minimum Two-Year Follow Up, Spero G. Karas, M.D., Thomas J. Noonan, M.D., Marilee P. Horan, and Richard J. Hawkins, M.D.; and *High Tibial Osteotomy and Chondral Resurfacing in the Varus Knee*, William I. Sterett, M.D., and J. Richard Steadman, M.D.

Tricia Murray, biomechanist, reports that two research papers have been accepted with revisions for publication in the *American Journal of Sports Medicine*: "The Effects of Extended Play on Professional Baseball Pitchers," Tricia A. Murray, Timothy D. Cook, M.S., Sherry L. Werner, Ph.D., Theodore F. Schlegel, M.D., and Richard J. Hawkins, M.D.; and "Relationships Between Throwing Mechanics and Shoulder Distraction in Professional Baseball Pitchers," Sherry L. Werner, Ph.D., Thomas J. Gill, M.D., Richard J. Hawkins, M.D., Tricia A. Murray, and Timothy D. Cook, M.S. A third paper was accepted with revisions in the *Journal of Shoulder and Elbow Surgery*: "Relationships between Throwing Mechanics and Elbow Valgus in Professional Baseball Pitchers," Sherry L. Werner, Ph.D., Tricia Murray, Richard J. Hawkins, M.D., and Thomas J. Gill, M.D.

Sports medicine continues to be interested in knee bracing research. *Biomechanics*, a publication for orthopaedic surgeons, physical therapists and athletic trainers will publish in 2000 an article by **Mike Decker, M.S.** and **Michael Torry, Ph.D.** on "Landing Performance after ACL Reconstruction."

Education

The Tenth Annual Fellows meeting was held in December in Vail. The meeting annually brings together orthopedic surgeons, now numbering more than 100, who have participated in the Steadman-Hawkins Fellowship program. Featured speakers included **Shawn O'Driscoll, M.D.**, from the Mayo Clinic. Dr. O'Driscoll presented a topic of high interest on cartilage regeneration: "Articular Cartilage Regeneration Using Periosteum." **Savio Lau-Yuen Woo, Ph.D.**, professor of Orthopaedic Surgery, University of Pittsburgh, presented "ACL Reconstruction: How Well Are They Doing Under a Pivot Shift Test." **Dr. Charles Ho**, radiologist from National Orthopaedic Imaging Associates, discussed "Advanced MRI of the Shoulder: Role of Intravenous vs. Intra-Articular Contrast Studies."

In February, the second **Sprint Distinguished Visiting Lecture Series** was held. Featured this year was **Van C. Mow, Ph.D.**, professor of Biomedical Engineering and Orthopaedic Bioengineering, Columbia University, and **Marcus Pandy, Ph.D.**, Department of Kinesiology and Mechanical Engineering, University of Texas (Austin). Dr. Mow addressed the Foundation on two topics: "New Knowledge for Knee Biomechanics and Computer-Aided Surgical Planning," and "Structure and Function of Normal and Osteoarthritic Articular Cartilage."

Dr. Pandy's topic covered musculoskeletal computer modeling of human motion. Also visiting was **Dr. John A. Feagin, Jr.**, professor of Orthopaedics, Duke University and a member of the Foundation's Scientific Advisory Board.

Media

The radio show *Colorado SkiTalk* devoted one hour in November to an interview with world ski champion **Picabo Street**, her physician **Dr. Richard Steadman**, and conditioning authority and trainer **John Atkins**.

The *Winged Foot*, a publication of the New York Athletic Club, published an article by William Rice, senior writer for ABC News: *Weight Bearing Exercise, the Secret to Safer Skiing*. The article discussed the importance of weight-bearing exercise and referenced the Foundation's fall newsletter and the June 14, 1999 *NewsWeek* article, *Weight-Bearing Exercise for a Healthier Body*. "Dr. Steadman," said Rice, "has surrounded himself with supremely talented physical therapists, specifically John Atkins and Topper Hagerman. The trio from the Steadman-Hawkins Sports Medicine Foundation laid out the mission of U.S. sports medicine for the millennium: Get the nation off its fatty assets." The publication has a circulation of about 50,000.

In January, **HBO** with **Bryant Gumbel** featured Steadman-Hawkins patient and Denver Broncos All-Pro running back **Terrell Davis** with Dr. Richard Hawkins. Davis discussed his rehabilitation program following reconstructive knee surgery.

The *Denver Rocky Mountain News* reported in January that **Terrell Davis** has been running for several weeks and continues to use a "**Sport Cord**," the conditioning device developed by John Atkins, M.S., and Topper Hagerman, Ph.D. The Sport Cord's series of exercises have been scientifically validated in the Foundation's Biomechanics Research Lab.

FOX Sports' *Snow Motion* show visited Vail in February to cover the third annual Steadman-Hawkins All-Star Ski Celebration fund-raising pro-am ski race. The nationally viewed program, available to over 100 million homes,

featured interviews with Drs. Steadman, Hawkins and Sterett, and Steadman-Hawkins patient-alums **Marc Girardelli**, **Cindy Nelson** and **Chad Fleischer**. The interviews focused on the importance of Foundation research.

In early summer, the Foundation will again be in the national spotlight. **FOX** network's *Forever Young* has produced two shows on the Foundation, scheduled to air in late May or early June. The show's theme, keeping people active, will cover Microfracture, High Tibial Osteotomy, the Thermal Heat Probe, and rehabilitation. Look for *Newsweek's* latest Foundation article *Spring Back* to appear in June.

The *Denver Rocky Mountain*

News reported in March that Italian star soccer player **Alessandro Del Piero** is tearing up the Italian Serie A League. His Juventus of Turin team was undefeated in 20 games as he scored one goal and assisted on another in beating Bari 2-0. Following a serious knee injury in November 1998, Dr. Steadman surgically repaired Del Piero's anterior cruciate ligament and performed a minor healing response procedure on his posterior cruciate ligament. Dr. Steadman has treated the knee injuries of several professional soccer players, including Italian Serie A stars Nicola Berti and Maurizio Ganz, Brazilian star Giovane Elber, who

plays for Bayern Munchen, and former German National Team Captain Lothar Matthaeus.

Speaking of **Matthaeus**, *USA Today* reported in March that the former Steadman-Hawkins patient will finish his illustrious career playing for the New York Metro Stars of Major League Soccer. Matthaeus played on a record five world cup teams for Germany and was Germany's player of the year in 1999.

Dan Marino, Former Steadman-Hawkins Patient, Retires

Steadman-Hawkins patient-alum and former Miami Dolphin quarterback **Dan Marino** announced his retirement in March after 17 seasons. A member of the famous "Class of 1983" college quarterbacks entering the NFL that year, Marino set several all-time NFL career records, including 61,000 yards passing and 420 touchdown passes. Dr. Steadman preserved Marino's career by repairing his knee in 1986.

What two things does Dan Marino have in common with John Elway and Joe Montana? All three quarterbacks will some day be enshrined in Pro Football's Hall of Fame and all three are Steadman-Hawkins patients.

Steadman-Hawkins could field quite a fantasy team—Marino, Elway, Montana, Terrell Davis, Bruce Smith, etc—but we might have a quarterback controversy.



Denver Broncos running back Terrell Davis is escorted to the locker room by team doctors Richard Steadman, left, and Martin Boublik, right, after he injured a knee during the first quarter of the Jets-Broncos game at Mile High Stadium in Denver on Sunday, Oct. 3, 1999.

AP PHOTO / ED ANDRIESKI.

Honors

Congratulations to **Mike Torry, Ph.D.**, director of the Foundation's Biomechanics Research Laboratory, who has been appointed Adjunct Professor in the Department of Kinesiology and Applied Physiology at the University of Colorado. Dr. Torry was also named adjunct professor in the University's newly created Department of Biomechanics, which begins operations in August. ■

(*SHOULDER INJURIES cont.* from pg. 1)

causes pain. Diagnosis of instability can be difficult because instability can be in one direction or in a combination of directions. Orthopaedic surgeons can correctly diagnose glenohumeral instability with a detailed physical exam, a complete medical history, X-rays and MRIs as diagnostic tools.

In the general population, shoulder instability may result from one initial traumatic episode, or evolve over many years of overuse. An acute injury can occur by a blow to the shoulder, whereas a chronic injury is more common in overhead workers or athletes (pitchers, swimmers). Patients themselves differ in lifestyles, employment, and genetic factors like collagen-type, which can contribute to the degree of shoulder instability. Some people experience a shoulder dislocation while others experience subluxation, which is the excessive movement of the humeral head within the joint. Frequently, patients will often complain that the arm "slips" out and then back "in" with certain activities. Pain and/or weakness that interfere with average daily living such as work, sport, and sleep seem to be the main complaint from patients seeking help. Instability and global shoulder fatigue can interfere with the performance of overhead athletes. Some people, such as professional athletes or manual laborers that have jobs that require overhead activities, are often forced to change careers or lifestyles due to shoulder instability.

Many patients with a traumatic injury require surgical repair, whereas the instability caused by overuse may be treated with an aggressive rehabilitation program. Rehabilitation is often successful in lessening pain and symptoms by emphasizing the strengthening of the rotational musculature. When non-operative treatment fails, surgical intervention can restore stability to the shoulder. Traditionally, instability surgery involves cutting the surrounding muscles and opening the shoulder joint capsule. The loose ligaments are then sewn back more tightly to close the gap which is causing the shoulder to slip.

Because recovery time from open shoulder surgery can take months, doctors are now looking for a way to perform the surgery arthroscopically.

We are currently using an Oratec Interventions radio-frequency thermal device known as the Heat Probe to arthroscopically shrink capsular tissue. Radio-frequency energy has been used in surgery for many years to stop bleeding and cut tissue. Radio-frequency energy creates molecular movement of electrolytes within the cell, which is converted into heat. Thermal modification of collagen tissue — a basic building block of ligaments and tendons — involves the application of heat to reduce tissue volume to help stabilize the joint and decrease painful symptoms.

The goal of thermal shrinkage of the capsule is to create a tighter, more stable joint.

Immobilization of the arm after thermal treatment allows the tissue of the capsule to heal before it is stressed. Research by the Foundation has shown that if the tissue is not immobilized before healing has occurred, the tissue can stretch. We attempt to shrink the tissue about 50 percent of the desired amount at the time of surgery and then immobilize the arm to increase the amount of shrinkage. Too much shrinkage can lead to tightness, so patients are closely monitored and limited motion is allowed,

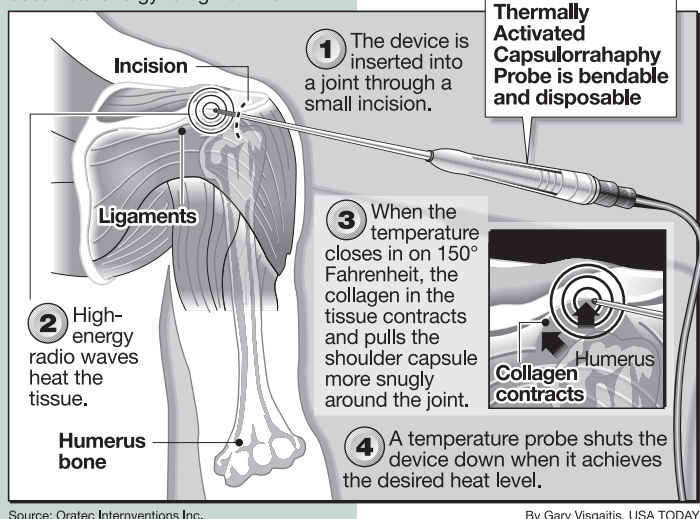
depending upon the degree of shrinkage needed. Since the strength of the tightened capsule is not known, a fairly conservative early rehab program is prescribed.

We have performed more than 200 thermal-stabilization surgeries to date and the early results are very encouraging. This new technique has been used on many patients, including both weekend and elite-level athletes. Our patient list included four NFL players, professional golfers, and many collegiate athletes, the majority of whom have returned to their prior level of performance. In 1998, Greg Norman sought help for his chronic shoulder problems. He now feels rejuvenated, is back competing, and is doing well.

We are excited about this new technology because it does not sacrifice function for stability. Patients have reported being satisfied with their surgery, and most would recommend it to a friend or family member with the same problem. More long-term follow up is needed, but we are very encouraged with the progress our patients are making. ■

Going to the shrink

The ligaments in an overused or injured shoulder joint can become loose over time. The device shown here by Oratec Interventions Inc. of Menlo Park, Calif., uses heat energy to tighten them.



KNEE BRACE PROVIDES STABILITY FOR ACL INJURIES

Findings show knee laxity may depend upon length of time since injury

By Michael Decker, M.S., staff scientist, Biomechanics Research Laboratory, and Michael Torry, Ph.D., director, Biomechanics Research Laboratory.

Following an injury to their anterior cruciate ligament (ACL), few patients are able to maintain previous levels of athletic activity. The ACL ligament is an important knee stabilizing structure, and when it is injured, the joint often becomes lax. Increased knee laxity from loss of the ACL allows the femur to abnormally slide on the tibia, causing the knee to give way. Most ACL sufferers experience “giving way” episodes resulting in secondary meniscus injuries and degenerative changes in the knee joint, while some have minimal “giving way” and secondary damage. Currently, it is not understood why some patients are able to compensate for changes in knee laxity from the loss of the ACL while others are left disabled.

Patients who are able to adapt to their injury demonstrate a unique ability to re-organize their movement and muscular firing patterns to provide greater knee stability. During walking, running and cutting, for example, ACL-deficient patients have demonstrated an ability to reduce quadriceps activity and increase hamstring activity. This ability is beneficial to knee stability because it protects the knee from excessive forward movement of the tibia, thus protecting it from “giving way” episodes.

Some ACL sufferers, however, are unable to stabilize their knee during sports and elect surgical reconstruction of the ACL. Others elect a non-surgical option and are prescribed a functional knee brace to mechanically increase joint stability and prevent further knee injury. The majority of research has generally determined the brace to be beneficial to performance. But currently, this performance benefit is not clearly understood.

Only a few researchers have investigated lower-extremity performance with a knee brace during athletic activities that mirror the stresses seen in sports such as basketball, volleyball and soccer. For these sports, the primary cause of ACL injury is a sudden deceleration movement, such as cutting or landing from



Researchers study vertical drop landing and knee bracing.

PHOTO COURTESY OF JOHN KELLY.

a jump. For these reasons, we studied a group of unstable ACL patients as they performed the task of vertical drop landing.

Preliminary results revealed that the ACL patients could be divided into two groups with a large amount of knee flexion. Greater knee range of motion after initial contact with the ground provides a softer landing, which is safer for the bones and soft tissues of lower-extremity joints. The other group performed the landing more stiffly, with minimum knee flexion. A stiff, more erect landing style is less desirable since it increases the quadriceps force on the front of the tibia.

Interestingly, the soft landers tended to have greater knee laxity and were further out from their date of injury, while the stiff landers had less knee laxity and were closer to their date of injury. This demonstrates that adaptations to ACL injury are not immediate and that there may be a time period before an appropriate muscular adaptation takes place. Further, newly injured ACL patients who return to competition may not yet be able to use a protective muscular adaptation to stabilize the knee, thus damaging the secondary structures of the knee. Over time, this lack of protection increases knee-joint laxity and sensations of “giving way.” These results may explain why most ACL-deficient patients never return to the same athletic level.

Despite the two distinct landing styles, landing with a knee brace resulted in a more erect landing with increased muscular power of the hip extensor muscles, including the hamstrings. The increased extensor output from the hip was more pronounced, and the hamstring muscles fired earlier in preparation for contact for patients with the greatest knee laxity values. Thus, the hip extensors and hamstring muscles functioned by muscularly constraining thigh rotation and forward tibial movement. Wearing a knee brace may provide stability that allows for greater muscular output from the quadriceps without compromising knee stability and performance. ■

(*SPRING BACK* cont. from pg. 1)

experience back problems, there’s much that can be done to reduce and avoid further pain and injury.

Most back problems are not the result of a single injury. Even though sudden pain may occur after a sneeze, or during a twist or lift, most injuries are actually caused by the cumulative effect of the things we do every day. You may know someone who “threw out” their back when they leaned over to tie their shoe, but in all actuality, that movement may literally have been “the straw that broke the camel’s back.” With stresses such as poor posture, faulty body mechanics, obesity, emotional tension and lack of fitness — all modern-day maladies — it’s no wonder lower back pain is one of society’s most common ailments.

Building A Better Back — What You Can Do

Learn and practice good posture and body mechanics

Healthy posture is comprised of three natural curves: the curve of your neck, middle back and lower back. When you maintain these curves in their normal alignment, your weight is evenly distributed throughout the structure of the spine and your back is least susceptible to injury. Your three curves are ideally aligned when your ears, shoulders and hips are in a straight line. A physical therapist, doctor or trainer can help you to develop a sense for this correct alignment.

Body mechanics refers to the way you move your body during every-day activities. By maintaining ideal alignment of the three natural curves, and keeping objects close to your body when lifting, risk of injury is greatly reduced. Physical and occupational therapists are experts in body mechanics and can instruct you in proper techniques for even the most challenging activities.

Exercise

Regular exercise is the single most important thing you can do to maintain a healthy back. Aside from its physical benefits, exercise reduces stress and improves emotional well-being. A successful back fitness program should include aerobic, flexibility and strengthening exercises.

Aerobic Exercise

Individuals who are in good cardiovascular condition are less likely to sustain back injuries. Walking, biking, swimming, snow shoeing, cross country skiing and even running are just a few examples of healthy activities for your back, as long as they are performed in a safe, reasonable manner. Aerobic exercise should be undertaken 3-4 days a week, with rest days in between. If this is new for you, start with 10-15 minute sessions and build to 30 minutes per session.

Flexibility Exercises

Poor flexibility, especially in the hips shoulders and chest, can be a key contributor to lower back and neck pain. If the hip joints and/or muscles are stiff, your body will adapt by taking the path of least resistance, which is often a hypermobile spine. In other words, if your hips don't move freely, your spine will compensate by moving more than it should, and this in turn leads to back problems.

In developing a stretching program, it is important to first assess your own flexibility. A good guideline is this: If you have limited range of motion and feel stiffness at the end of the range, you need to stretch that particular structure. However, if you seem to have full range of motion and no stiffness is felt, stretching is probably unnecessary. This is important, because it is possible to be too flexible. Overstretched joints can become unstable and overstretched muscles can become weak, contributing to muscle imbalance problems. If you have questions

regarding your flexibility program, check with a physical therapist, doctor or trainer.

The best time to stretch is after physical activity, but it is also beneficial to stretch intermittently throughout the day, especially after being in one position for a long time (generally "undoing" the prolonged position is best — i.e., extending backwards after sitting or driving, or flexing forward after painting overhead).

The following stretches are best for active individuals. However, they should first be performed as a test. Include these stretching exercises in your program only if you experience stiffness.

Hold each of the following stretches for 20 seconds and repeat 2-3 times. Remember: GENTLE STRAIN, NO PAIN.

Low Back and Gluteal Stretch

Lying on your back, use your hands to bring one knee towards your chest, and then straighten the opposite leg. Repeat with the other side.



Hamstring and Calf Stretch

Lie on your back. Raise one leg, supporting with hands behind your thigh. Then straighten your knee and move your ankle so that your toes point towards you. Repeat with the other side.



Hip Rotator Stretch

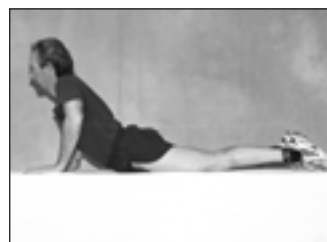
Lie on your back with knees bent. Cross your ankle over the opposite knee. For further stretch, lift your lower leg up, as pictured.



Prone Press Up

Lie on your stomach with your hands next to your shoulders. Use your arms to push your chest off the floor and arch your back. Relax the back and buttock muscles.

Caution: Do not perform this stretch if you have been diagnosed with stenosis, spondylolisthesis, or if it causes back/leg pain.



Hip Flexor/Quadriceps Stretch

In standing, bend your knee and pull your heel towards your seat, using your opposite hand. Then, tighten your abdominals and buttock muscles. Repeat with the other side.



Strengthening Exercises

Well-balanced muscle strength is essential in maintaining good posture and a healthy back. A healthy spine is supported by strong back, hip and abdominal muscles.

Many of the top athletes we work with have benefited from core stabilization or strengthening of the trunk muscles. Not only has this helped to prevent back injuries, it has also improved their athletic performance. To use an analogy, if a person jumps off a stable dock into a lake, he's able to gain more height and distance than if he were to jump from a rowboat. The same holds true for the human body. Your arms and legs can work more powerfully and efficiently off of a stable trunk, compared to a weak, unsteady one.

Also, keep your arm and leg muscles strong with resistance exercise. They are especially important in performing good body mechanics during lifting. If the arms or legs fatigue quickly, it's easy to resort to unsafe methods which place the back in compromised, stressful positions.

Strengthening exercises should be performed 2-3 days per week with a day in between. The following strength exercises provide a good balance of core muscle stabilization.

Lower Abdominal Exercise

Lie on your back with knees bent. Tighten your abdominals by pulling your belly button in toward your spine and gently tilting your pelvis backwards. You should feel the arch in your low back decrease. Maintain this pelvic position as you lift one foot off the floor, then the other. Slowly extend your opposite arm and leg, only as far as you are able.



Upper Abdominal Curl-Ups

Lie on your back with knees bent. With hands behind your head, tuck your chin towards your throat, and then lift your shoulders



off the floor by curling your trunk. Hold for three seconds, and then slowly lower. Repeat 30 times. This exercise may also be performed diagonally, as shown, to strengthen the obliques. **Caution: Do not perform this exercise if you experience acute disc problems.**

Back Extensor Exercise

Start on your hands and knees. Lift your opposite arm and leg so they are parallel with your back. Hold five seconds, and then change sides. Repeat 10 times. This may also be performed lying on your stomach.



Remember, the key to a healthy back is injury prevention. Be proactive and "Watch your back"! ■

STEVEN AND MICHELE KIRSCH FOUNDATION GRANT FUNDS KNEE/SHOULDER WEBSITE

Visit www.shsmf.org/FAQ

Thanks to Steven and Michele Kirsch, a new consumer website dedicated to answering questions about knee and shoulder injuries and their treatment has debuted on the Internet. The new site, created by the Steadman♦Hawkins Sports Medicine Foundation, will be prepared by Dr. Richard Steadman and Dr. Richard Hawkins and their Foundation staff, and will be funded by a \$100,000 grant from the Steven and Michele Kirsch Foundation. The website will provide orthopaedic and sports medicine information on the knee and shoulder, written in lay language, clearly and simply illustrated and updated regularly.

The Steadman♦Hawkins Sports Medicine Foundation is dedicated to the goal of keeping people active. The Foundation's work includes exploring the causes and cures of degenerative joint disease, as well as researching the prevention and repair of traumatic sports-related injuries.

The Steven and Michele Kirsch Foundation, located in San Jose, California, is committed to an array of issues and causes. While one of its primary activities is support for medical research, it also engages in advocacy efforts to improve the environment, political reform activity, and the encouragement of proactive and strategic philanthropy.

According to Steadman♦Hawkins Sports Medicine Foundation CEO Dr. Charles Dillman, the new website will fill a growing need. "We are most gratified," says Dr. Dillman, "that Steven and Michele Kirsch and their Foundation recognize the need for simple answers to medical questions and have become our partners in this important endeavor. In the last several years, the Internet has flooded us with huge volumes of information on every medical subject imaginable. But most of the information is too technical to be useful. The non-medical person has nowhere to turn for the answer to a specific, orthopaedic question.

"Our objective is to provide simple answers to the most frequently asked questions about knee and shoulder injuries. These injuries are

the most common among sports injuries these days. A site visitor might ask, 'I fell while skiing and twisted my knee. It hurt when I did it, but now it seems to be OK— unless I do a deep knee bend. Then it hurts like hell. Should I see a doctor or give it time to heal by itself?'

"That person will find a series of diagnostic questions on our new site that will help define the nature of the injury. The answers to those questions should suggest a prudent course of action, based on our clinical experience at the Steadman Hawkins Foundation."

The site will be structured in categories, including sections on the anatomy of the knee and shoulder, the biomechanics and prevention of injury to both joints, surgical interventions to both the knee and shoulder, and the rehabilitation of both joints. There will also be hyperlinks to related sites.

"We want to keep the information simple as well as current," says Dillman. "The language will be non-medical and the questions we answer will evolve with the questions we receive on the site. Our objective is to make this site an effective location for people with knee and shoulder injuries.

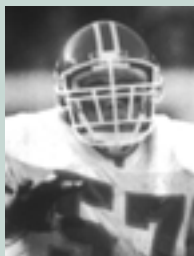
"But, perhaps most important, we want to educate people about their bodies and help keep them in the game. We're big promoters of the active lifestyle. We also know that you feel better when you're active and, as a result, you'll live a longer, fuller life."

Visit the new Steadman Hawkins Knee and Shoulder website at www.shsmf.org

(A TALE OF TWO ATHLETES cont. from pg. 1)

Without this revolutionary surgery, it's likely that Wyman and Cauchois would be facing total knee replacement at some point, sooner rather than later, during their lives.

Dave Wyman, 35 years old and retired from the pro gridiron for five years, is now a financial consultant with Merrill-Lynch in Scottsdale, Ariz. The day he dislocated his knee on the field at Stanford ("It was a day I'll never forget—I still have nightmares about it"), doctors at first could not find a pulse in his lower leg. A half-hour later, a pulse was finally discovered—but, says Wyman, "For a while, there was that lingering doubt whether I'd ever walk again." The knee was repaired by Stanford doctors, but while he was recuperating, a friend paid him a visit "Ken Margerum, who was then playing for the Chicago Bears, came to see me. He had been to Dr. Steadman for knee surgery and, always a free spirit, he came in jogging and starting doing laps around my wheelchair. He convinced me to call on Dr. Steadman, who was then in Tahoe. Because Ken was a mentor to me, that's all it took. I went to see Dr. Steadman in 1985 and he, John Atkins and Topper Hagerman got me back in shape. I missed the next year, but came back my senior year to be named All-Pac and All-American."



Former NFL player
Dave Wyman.

Wyman has since had nine knee surgeries—two on his left knee, six on his right—all but one by Dr. Steadman. But what really turned his life around was microfracture, which Dr. Steadman performed on him in 1989, his second year in the pro leagues. "I was feeling a lot of pain in my left knee, and it would give out without warning. Since microfracture, I've never had any problems with my knee."

Wyman, in fact, now jogs on his treadmill an hour a day, plays basketball, goes hiking, mountain biking, and plays a pretty aggressive game of squash. All without pain.

"I've gained so much confidence," Wyman says today, "And that's because of Dr. Steadman. He's one of those special people you meet in life that you just know and trust. He's absolutely the best at what he's doing. And the same goes for John and Topper and the entire Steadman-Hawkins staff. They're really on the cutting edge."

Scott Cauchois was not an All-American, and he never played with the pros. Nonetheless, this former Berkeley soccer player suffered a devastating injury when his knee gave way during an indoor-league match in 1992, resulting in a torn ACL, extensive cartilage damage and an injured femur. He had heard good things about the Steadman-Hawkins Clinic, so it was off to Vail—where, in 1992, he underwent an ACL reconstruction, then microfracture surgery to repair his cartilage.

"I feel great today," says the 33-year old human-resources software sales manager from San Francisco. "It was pretty much a miracle. I'm still not 100 percent—maybe 95 percent. But the staff at the Steadman-Hawkins Sports Medicine Foundation still continue to survey and follow my progress, and that's been a real confidence-booster for me. I'm very impressed by the Steadman-Hawkins Clinic. You take a top doctor like Dr. Steadman, coordinate what he does with the Steadman-Hawkins rehab group, and you end up with pretty much a state-of-the-art prescription for healthy knees."

Scott's rehab was intensive: non-weight-bearing for two months, then sessions on a continuous-passive-motion machine for eight hours a day for two months (since he worked during the day, the sessions had to be performed at night), then light bike and flexibility exercises. But, Scott admits, it was worth it. Especially since he had set aside his soccer shoes to sign up for the Race Across California Enviro.

If he thought rehab had been arduous, it was nothing compared to the Enviro, a four-day stage race between Lake Tahoe and the Golden Gate Bridge.

Over the next four days, he and three teammates would log 37 miles of wilderness running, 83.5 miles on mountain bikes, 165 miles on road bikes, and 25 miles of river kayaking. Grueling, yes. But after winning the four-man event with a time of 35 hours, 56 minutes and 20 seconds, Scott's only reaction was "It was fun—and a great way to see California."

Had he not had the good fortune to meet Dr. Steadman, and reap the benefits of microfracture, he may well have been sitting in front of the TV watching indoor soccer. ■

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.

ADMINISTRATION

Charles J. Dillman, Ph.D.
Chief Executive Officer

Topper Hagerman, Ph.D.
Chief Operating Officer

Debbie Diamond
Accounting Manager

Karyll Nelson
BioSkills Laboratory Director and Executive Assistant

DEVELOPMENT

John G. McMurtry, M.A., M.B.A.
Program Advancement

Patricia Herrington
Director of Development

Rachel Lenz
Development Associate/Grants Manager

Lizzie Burnett
Administrative Assistant

BASIC SCIENCE

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

Liss Gruen, J.D., M.D.
Research Intern

CLINICAL RESEARCH

Karen K. Briggs, M.B.A.
Director

Marilee Horan
Research Associate

Elizabeth Reschly
Research Assistant

Amy Ruther
Research Associate

Hillary Saxon
Research Intern

Ryan Marshall
Research Intern

BIOMECHANICS RESEARCH LABORATORY

Mike Torry, Ph.D.
Director of Biomechanics Research Laboratory

Mike Decker, M.S.
Staff Scientist

Michelle Sabick, Ph.D.
Senior Staff Scientist

Kevin B. Shelburne, Ph.D.
Senior Staff Scientist

EDUCATION

Holly Horvath
Coordinator

TECHNICAL RESOURCES

Jeffrey T. Whitman
Information Systems Manager

VISUAL SERVICES

John Lenk
Director

Karen Melhart
Production Coordinator

Nate Neese
Intern

Mark Your Calendar

August 5, 2000

Invitation to the Dance. A gala dinner, wine auction and dance at the Larkspur Restaurant at Vail, Colorado. For more information, contact Rachel Lenz at 970-479-5786 or e-mail rachel.lenz@shsmf.org.

August 18-19, 2000

International Cartilage Symposium. The Lodge at Vail, Vail, Colorado. For more information, contact Holly Horvath at 970-479-5786 or e-mail rachel.lenz@shsmf.org.

December 6-9, 2000

Eleventh Annual Steadman Hawkins Fellows Meeting. The Lodge at Vail, Vail, Colorado. For more information, contact Holly Horvath at 970-479-5786 or e-mail rachel.lenz@shsmf.org.

January 19-21, 2001

Fourth Annual Steadman Hawkins All-Star Celebration Ski Race, Beaver Creek, Colorado. For more information, contact Rachel Lenz at 970-479-5786 or e-mail rachel.lenz@shsmf.org.

A growing popularity in estate planning today is living trusts. Like a will, you can utilize this instrument to stipulate how your property and other assets will be distributed to your family, friends and charitable interests. You can use a living trust to manage your property during your lifetime and make financial distributions. If you are considering this or any other planned estate methods, and the Steadman◆Hawkins Sports Medicine Foundation is among the charities you would like to benefit, it helps us to know for our future financial planning. If you would like to discuss this option, please contact Patricia Herrington (970) 479-9797 ext. 5271.



Steadman◆Hawkins
Sports Medicine Foundation

A 501(c) (3) Non-Profit Organization

181 West Meadow Drive
Suite 1000
Vail, Colorado 81657
970-479-9797
970-479-9753 FAX
<http://www.shsmf.org>

Non-Profit Org.
US Postage
PAID
Denver, CO
Permit No. 4033