

PATIENTS IN THE NEWS:

Joan Birkland: A Septuagenarian Returns to the Course

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.

Most people in their seventies think about sweet memories, about visiting old friends and loved ones, about doing a little travel, about reading those books they never had time for, about... well, kicking back.

Joan Birkland, 71, doesn't think about any of those things. She thinks about shaving her golf handicap—from a 7 to a 5. And after nursing and rehabbing a torn rotator cuff for the last five years, she just may do it. A Denver native, Birkland is a former Colorado state tennis and golf champ (she won both titles, back-to-back, *twice* in the late Sixties and is a seven-time Colorado Women's Golf Association champion) whose energy, enthusiasm and sheer athletic power go far beyond her legendary performances on the course and the court. She's also a savvy organizer and promoter of women's sports. She has served as a member or director of USGA's women's committee (1991-2001), was named to the Colorado Golf Hall of Fame (1977), was inducted into the Colorado Sports Hall of Fame (1981), was team captain of the women's U.S. amateur golf team last year, and is today the executive director of Sportswomen of Colorado, a board member of the Colorado Women's Open, Girls In Golf, and National Girls and Women in Sports Week.

A pretty full slate for someone, at any age, who hopes to not only return to the game but return in better shape than when she left it.

Birkland's shoulder problems started when she began dispatching opponents on the tennis court with her American Twist serve. "It was the big serve in my day, throwing the ball up behind you to put a giant twist on the delivery. But it wasn't too kind to your back and shoulder. Today

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SPORTS AND WELLNESS

Save Your Rotator Cuffs

By Darren Liebman, contributor to Shark.com

Editor's Note: The following is an adaptation of an article that appeared on Shark.com, the Web site of Professional Golfer and Steadman-Hawkins Sports Medicine Foundation board member Greg Norman.

This article focuses on the rotator cuffs, the most important muscles you've never seen. Rotator cuffs are like undercover cops: You usually don't know they're there—hidden under the more powerful shoulder muscles—until you injure them. And when you do, they're quick to alert you.

The rotator cuffs are made up of four small muscles (supraspinatus, infraspinatus, teres minor and subscapularis), but the importance of their role dwarfs their size. The rota-

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PHOTO COURTESY OF JOHN KELLY.

STEADMAN-HAWKINS RESEARCH UPDATE:

Cytokines and Growth Factors: New Remedies for Tissue Repair "Signaling" Proteins Tell Cells What to Do

By J. Rodrigo, M.D.

Editor's Note: Dr. Rodrigo is Professor of Orthopaedic Surgery at the School of Medicine, University of California (Davis), and a member of the Steadman-Hawkins Sports Medicine Foundation's Scientific Advisory Committee.

An exciting time is upon us for developing new approaches to the repair and regeneration of ligaments, tendons, cartilage and menisci of the joints, all tissues that are frequently damaged in an athletic injury. Until now, we have concentrated on techniques that bring a new blood supply and, in turn, a blood clot to the injured area. The clot con-

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YOUR RETIREMENT ACCOUNT: FULFILLING YOUR PERSONAL AND PHILANTHROPIC GOALS

The IRS Makes It Easy

Good news! In January, the IRS created new rules to help you determine the required minimum distributions from IRA and other retirement accounts during your lifetime. The new rules use one uniform table (unless you are married to someone 10 years younger than yourself) to determine the portion of your plan that must be distributed each year after you turn 70 1/2. The new rules also make it easy for you to name the Steadman♦Hawkins Sports Medicine Foundation as a beneficiary of your retirement account. With the new rules, the minimum you must withdraw each year no longer increases when you designate us as beneficiary.

The IRS Makes It Tough

Good news as this is, tax rules still exist that can dramatically impact the amount your heirs may ultimately receive if they are beneficiaries of your retirement account. In fact, that amount may be reduced to pennies per dollar due to numerous layers of taxation to which retirement accounts can be exposed.

You Can Make It Easier

There is, however, a way to circumvent this: Re-designate your assets. For example, suppose you had created a cash bequest for the Foundation and designated a percentage of your retirement account for your children. You may, in consultation with your advisors, find that more wealth could be transferred to loved ones by bequeathing the cash to them and naming the Foundation as a beneficiary of your retirement plan.

You Can Set The Course

Retirement plan assets present attractive opportunities for charitable giving. However, it is important to work with a qualified estate planning professional who understands the tax implications. When you do, we invite you to name the Steadman♦Hawkins Sports Medicine Foundation as a primary or partial beneficiary of your retirement account. Your gift will set our course for the future to make a quality, physically active life possible for many.

It would be our pleasure to discuss with you, or your advisors, the difference you want your gift to make. Please call John McMurtry at (970) 479-5781 for information on gifts of retirement assets, other ways to include the Foundation in your plans, or The Founders' Legacy Society. Or, you may return the addressed mailer.

Please know that all information is confidential and requests for information never represent an obligation. ■

U.N. AND WORLD HEALTH ORGANIZATION ENDORSE BONE AND JOINT DECADE 2000-2010

Musculoskeletal Disorders Cost \$215 Billion a Year in the U.S. Alone

The Bone and Joint Decade 2000-2010 is an international effort to advance understanding and treatment of musculoskeletal conditions and to promote research. In November 1999, United Nations Secretary-General Kofi A. Annan issued a statement of support for the Bone and Joint Decade. Annan's message noted the vast impact of musculoskeletal diseases and conditions worldwide, saying, "There are ways to prevent or treat these disabling conditions. But we must act on them now. The United Nations, the World Health Organization, national and international organizations, and health care professionals are working globally with the Bone and Joint Decade movement to improve the quality of life for people with musculoskeletal conditions." The goals of the Bone and Joint Decade are four-fold:

- To raise awareness of the growing burden of musculoskeletal disorders in society.
- To empower patients to participate in their own care.
- To promote cost-effective prevention and treatment.
- To improve prevention and treatment of musculoskeletal disorders through medical research.

Musculoskeletal disorders have a huge impact on society. Here are the facts:

- One out of every four Americans suffers from a musculoskeletal condition caused by injury or disease.
- In the U.S. alone, musculoskeletal problems cost \$215 billion a year and will strain health-care services worldwide in the next 10-20 years.
- In the U.S., musculoskeletal disorders account for 131 million visits to physicians' offices, hospital outpatient departments and hospital emergency rooms.
- Nearly 36 million people suffer from musculoskeletal impairments that restrict their ability to perform the routine tasks of daily living. Musculoskeletal disorders are a leading cause of absence from work.
- Musculoskeletal impairment—more prevalent in older segments of the population—will increase over the next 30 years.
- Forty percent of all women over the age of 50 are expected to suffer at least one fracture related to osteoporosis in their lifetime.
- Worldwide, musculoskeletal disorders are the most common cause of physical disability and severe long-term pain. They are the No. 1 reported category of impairment and rank No. 1 in visits to physicians' offices.
- Musculoskeletal conditions and deformities deprive children of normal development.
- Arthritis is the leading chronic condition reported by the elderly; it affects one of eight Americans of all ages and nearly 50 percent of people who are 65 or older.

- Arthritis is a more frequent cause of activity limitation than heart disease, cancer or diabetes.

Despite all the information that is available on the impact of these diseases, only \$92 million is currently spent worldwide on orthopaedic research. Of this total, only \$16 million is devoted to clinical research. An important objective of the Bone and Joint Decade is to increase awareness of these debilitating diseases and attract the funding necessary to support research. The good news: The Steadman♦Hawkins Sports Medicine Foundation is creating awareness and raising funds to tackle orthopaedic disease head on. For further information on the Bone and Joint Decade, log onto the website www.boneandjointdecade.org

Source: January 2000 *American Academy of Orthopaedic Surgeons Task Force on the Bone and Joint Decade Newsletter*, and The White House.

Did You Know?

- Osteoarthritis is a degenerative arthritis that is caused by the breakdown of cartilage (a protein substance that serves as a "cushion" between the bones of the joints) with eventual loss of cartilage in the joints. It is a degenerative joint disease in which the cartilage that covers the ends of bones in the joint deteriorates, causing pain and loss of movement as bone begins to rub against bone.
- Among the more than 100 different types of arthritis conditions, osteoarthritis is the most common, affecting more than 20 million people in the United States—12.1 percent of the population—mostly after the age of 45.
- Before age 45, osteoarthritis occurs more frequently in males. After age 55 years, it occurs more frequently in females.
- Osteoarthritis is responsible for more than 7 million physician visits every year.
- The Framingham Osteoarthritis Study (1987) reports 9.5 percent of persons aged 63-93 had symptomatic knee osteoarthritis: "Knee osteoarthritis accounts for more dependence on others in climbing stairs and walking than any other disease."
- Eighty percent of people with osteoarthritis report some form of limitation in movement or activities.
- Knee osteoarthritis can be as disabling as any cardiovascular disease except stroke.
- Musculoskeletal conditions such as osteoarthritis cost the U.S. economy nearly \$65 billion per year in direct expenses and lost wages and production—an impact equal to a moderate recession.

Unfortunately, half of all Americans with arthritis do not believe anything can be done to help them. But there is reason for hope. The Steadman♦Hawkins Sports Medicine Foundation is making advances in prevention, diagnosis and treatment of osteoarthritis. The Foundation's development of microfracture, and research into more effective and safer rehabilitation and exercise protocols, are leading a promising effort on many fronts.

Source: *Arthritis Foundation and Arthritis Research Institute of America*

NEW FELLOWSHIP CHAIRS PLEDGE SUPPORT FOR ARTHRITIS RESEARCH

Mr. and Mrs. Jay Jordan, Mr. Ron Miller and Mr. and Mrs. Lawrence Flinn, Jr. have each pledged \$125,000 over the next five years to fund the Mr. and Mrs. Jay Jordan, Mr. Ron Miller and Mr. and Mrs. Lawrence Flinn, Jr. Fellowship Chairs. Each Chair will be dedicated to continuing research of osteoarthritis, a degenerative disease which afflicts 20.7 million Americans.

The Jordan, Miller and Flinn Fellows will be actively involved in Clinical Research, Basic Science and Rehabilitation/Human Performance research of degenerative joint disease. While the new technique of microfracture is frequently used to stimulate cartilage tissue re-growth in the knee joint, new protocols are being developed to correct shoulder-joint instability.

The Jordan, Miller and Flinn families have all experienced firsthand the importance of these new procedures. Ron Miller played collegiate football at the University of Southern California and went on to play professionally for the Los Angeles Rams. Following his football career, he joined Walt Disney Productions and later

became Chief Executive Officer. Presently, he is involved in Silverado Broadcasting and his family-owned Silverado Vineyards.

Jay Jordan is Chairman and Chief Executive Officer of Jordan Industries, based in Chicago, which owns and operates more than 40 subsidiary businesses. He sits on more than 40 public, private and philanthropic boards, including a trusteeship at his alma mater, Notre Dame.

Lawrence Flinn is the founder of United Video Satellite Group, now merged into the publicly held Gemstar International. Lawrence and his wife Stephanie, a botanical artist, have become dedicated supporters of the Foundation since Mr. Flinn's problems with his knee and shoulder led him to Dr. Steadman and Dr. Hawkins.

Funding of these chairs ensures that the Fellows of the Steadman♦Hawkins Sports Medicine Foundation will be trained to offer their patients leading-edge information and techniques in the treatment of osteoarthritis.

**THE GOOD NEWS: THE
STEADMAN♦HAWKINS
SPORTS MEDICINE
FOUNDATION IS CREATING
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HEAD ON.**

MEET OUR STAFF:

Holly Horvath, Education Department Director

By Rachel Lenz, Development Associate



Holly Horvath

Holly Horvath joined the Foundation staff in March 1999 as the Education Program Coordinator. She was promoted to Director of the Education Department and has expanded the department to include another staff member—Greta Campanale, Education Coordinator/Librarian—in addition to herself.

Holly grew up in Los Angeles and always wanted to live in the mountains. She moved to Vail in 1995 after graduating from the University of Michigan as an English major. Holly's interests in sports medicine and event planning eventually led her to the Steadman♦Hawkins Sports Medicine Foundation.

In addition to the management of the Library, the Education Department is responsible for organizing all Foundation education programs, including the Fellowship Program, visiting physicians and presenters, U.S. Ski Team physicians program, and conferences such as the Annual Fellows Meeting, the Cartilage Symposium, and corporate sponsor meetings.

One of the major components of the Education Department is the Fellowship Program, a post-doctorate program accredited by the Accreditation Council for Graduate Medical Education. Each year, six orthopaedic surgeons spend a year assisting Drs. Steadman, Hawkins, and Sterett at the Clinic and conducting research at the Foundation. Through the Fellowship program, the Foundation is able to share its research results with others in the orthopaedic community. Patients around the world benefit from the dissemination of knowledge and use of the techniques that are researched and learned at Steadman Hawkins. Holly brings great enthusiasm to every aspect of her job. She enjoys working with the current doctors and past, present and future Fellows—"It's great to meet such intelligent, pleasant, high caliber people"—and is often the first contact that prospective Fellows have with the Foundation.

In organizing academic events, lectures and conferences, Holly attends as many sessions as possible. The most interesting and intriguing part of her job, she says, is the subject matter and content of these programs. After sitting in on so many academic sessions without any formal medical training, Holly recently completed a class in anatomy and physiology to better understand the terminology. She intends to remain in sports medicine and appreciates that "my job enables me to be on the periphery and see all fields of the sports medicine profession, including training and practicing doctors, physical therapists, nurses, researchers, and administrators." It's difficult to talk

about Holly without mentioning her personal enthusiasm for fitness and sports. She conducts a sports conditioning class every ski season at the Avon Recreation Center and loves to bike, hike, ski and snowshoe. And even though she enjoys whipping folks into shape, she also likes to bake her one of a kind, killer brownies and fatten up the Foundation and Clinic staff. ■

STEADMAN♦HAWKINS UPDATE

Publications, Presentations and Research

Foundation Major Contributor at American Academy of Orthopaedic Surgeons Meeting

The Steadman Hawkins Foundation was well represented—with a record number of presentations, posters and teaching videos—at the 68th Annual Meeting of the American Academy of Orthopaedic Surgeons (AAOS) Feb. 28 -Mar. 4. The AAOS, which held its annual meeting in San Francisco this year, represents more than 17,000 orthopaedic surgeons. The Foundation's Clinical Research Department prepared seven presentations and poster exhibits, as well as abstracts, symposia, panel discussions and instructional lectures for Drs. Steadman and Hawkins.

Academy Highlights:

Dr. Richard J. Hawkins participated as an instructor in the symposium *From Cradle to Grave: Upper Extremity Trauma*, a continuing education course for nurses and allied health professionals.

A topic of great interest in orthopaedics is treatment and repair of cartilage tissue injuries. **Dr. J. Richard Steadman** was an instructor for the course *Articular Cartilage Injury in the Athlete: Treatment Options in 2001*. His subject was the Microfracture Technique, a procedure he has pioneered. **Dr. William G. Rodkey** was an instructor for the course *Arthroscopic Meniscus Repair*.

Poster presentations included *Analysis of Subscapularis Ruptures With and Without Prior Surgical Treatment*. (co-authors included **Thomas J. Noonan, M.D.**, **Marilee P. Horan**, and **Richard J. Hawkins, M.D.**) and *Electrothermal Arthroscopic Shoulder Capsulorrhaphy: A Minimum Two Year Follow-Up* (co-authors were **Spero G. Karas, M.D.**, **Thomas J. Noonan**, **Marilee P. Horan**, and **Richard J. Hawkins, M.D.**)

Thirty-three teaching videos were presented at the Academy, five of which were produced by the Foundation's Visual Services Department. For the second consecutive year, the Foundation submitted an award winner: *Repair of Injuries to the Extensor Mechanism: Quadriceps and Patellar Tendons*. **Congratulations to producer Karen Melhart, Richard J. Hawkins, M.D., J. Richard Steadman, M.D.** and to former Fellows **John Wright, M.D.** and **Spero G. Karas, M.D.**

Knee Braces Highlight Academy Specialty Days

The Foundation was also well represented during the American Orthopaedic Society for Sports Medicine and American Orthopaedic Foot and Ankle Society Specialty Days at the Academy. There is major interest among orthopaedic surgeons, therapists and trainers in knee

braces. Presentations focused on the long-term Foundation study of knee braces in reducing injuries in ACL-deficient skiers. The podium presentation, *Effect of Functional Bracing on Knee Injury in ACL-Deficient Professional Skiers*, was co-authored by former Foundation Fellow **Mininder S. Kocher, M.D.** (who made the presentation), **William I. Sterett, M.D.**, **Karen Briggs, M.B.A.**, David Zurakowski, Ph.D., and **J. Richard Steadman, M.D.** Among the symposia held was *Posterior Instability of the Shoulder*, which was moderated by **Dr. Richard J. Hawkins, M.D.**

Dr. Hawkins also presented *Classification, Evaluation and Surgical Treatment with Infrapinatus Tenodesis*. The poster *Determinants of Patient Satisfaction After Anterior Cruciate Ligament Reconstruction* was also presented, co-authored by **Mininder S. Kocher, M.D.**, **J. Richard Steadman, M.D.**, David Zurakowski, Ph.D., **Karen Briggs, M.B.A.**, **William I. Sterett, M.D.** and **Richard J. Hawkins, M.D.**

Ruptures of the distal triceps tendon of football players was the subject of the Sports Medicine Specialty Day Poster *Triceps Tendon Ruptures in Professional Football players*. Co-authors of this study included former Steadman-Hawkins Fellows **Scott Mair, M.D.**, **Theodore Schlegel, M.D.**, **Thomas Gill, M.D.** and **Richard J. Hawkins, M.D.**

Dr. Kocher presented *Partial Tears of the Anterior Cruciate Ligament in Children and Adolescents*. Co-authors included Anthony Luke, M.D., David Zurakowski, Ph.D., and Lyle J. Micheli, M.D.

A final presentation was made by **Dr. Kocher** at the American Orthopaedic Foot and Ankle Society Specialty Day Meeting: *Operative vs. Non-Operative Management of Acute Achilles Tendon Ruptures: Expected-Value Decision Analysis*. Co-authors included Anthony Luke, M.D., **Ryan Marshall** and **Richard J. Hawkins, M.D.**



Kennedy lecturer John Feagin, M.D. and daughter Nancy Feagin.

Kennedy Lectureship Honors Feagin

One of the highlights of each year's Sports Medicine Specialty Day is the John C. Kennedy Memorial Lectureship. **Dr. John Feagin**, a member of the Foundation's Scientific Advisory Committee and Professor Emeritus of Orthopaedic Surgery at Duke University, was honored as the distinguished lecturer for 2001. His presentation, *The Crucial Principals: Legends, Legacies and Lessons Learned*, touched on the highlights of his career in orthopaedics, many of which mirrored the advances made in sports medicine.

American College of Sports Medicine, 48th Annual Meeting, Baltimore, Maryland, June, 2001

Biomechanics Research Laboratory Director **Mike Torry, Ph.D.** reports that *The Effects of a Functional Knee Brace on the Neuromuscular*

Landing Performance of ACL Deficient Subjects will be presented as a poster. Authors include **Michael J. Decker, M.S.**, **Michael R. Torry, Ph.D.**, **Valerie J. Rich, M.A., ATC, CSCS** and **J. Richard Steadman, M.D.**

American Orthopaedic Society for Sports Medicine (AOSSM) Annual Meeting, Keystone, Colo., June 28-July 1, 2001

Karen Briggs, M.B.A., director of Clinical Research, reports that five abstracts have been accepted for presentation:

The Microfracture Technique to Resurface Full-Thickness Chondral Lesions of the Knee: Experience in National Football League Players. Co-authors: **J. Richard Steadman, M.D.**, **Spero Karas, M.D.**, **Theodore Schlegel, M.D.**, **Karen Briggs, M.B.A.**, and **Richard J. Hawkins, M.D.**

Determinants of Patient Satisfaction with Outcome after Anterior Cruciate Ligament Reconstruction. Co-authors: **Mininder S. Kocher, M.D.**, **J. Richard Steadman, M.D.**, **David Zurakowski, Ph.D.**, **William I. Sterett, M.D.**, and **Richard J. Hawkins, M.D.**

Lysis of Pretibial Patellar Tendon Adhesions ("Anterior Interval Release") to Treat Anterior Knee Pain After ACL Reconstruction. Co-authors: **J. Richard Steadman, M.D.**, and Steadman-Hawkins Fellow **Sumant Krishnan, M.D.**, and Steadman-Hawkins interns **Kim Hydeman**, and **Mathew Close**.

The Effects Of Immobilization on Tendon Healing Using a Trough-In-Bone Repair Technique in a Sheep Model: Biomechanical Analysis. Co-authors: **Theodore Schlegel, M.D.**, **Chad Lewis, Richard J. Hawkins, M.D.**, Susan James, Ph.D., Craig Mallinckrodt, Ph.D., and A. Turner, D.V.M.

Long Head of Biceps Brachii Tendon Tenodesis Comparing Three Fixation Methods: A Biomechanical Study. Co-authors: **James Johnson, M.D.**, **John Michelotti, M.D.**, **John Wright, M.D.**, **Scott Mair, M.D.**, **Richard J. Hawkins, M.D.** A Foundation study by former Fellow **Spero G. Karas, MD.**, *Proprioceptive Differences in Anterior Cruciate Reconstructed Knees: A Comparison of Patellar Ligament and Gracilis-Semitendinosus Techniques* has been accepted as the AOSSM podium presentation. The study was funded in part by a grant from the **Fred and Elli Iselin Foundation** of Aspen, Colorado.

Awards

The Foundation's newly designed Website has won three awards, *The Golden Web Award* for the years 2000/2001 and 2001/2002, and *The Surfer's Choice Award for 2001*. According to the site reviewer, "The Steadman-Hawkins Sports Medicine Foundation provides a simple and effective information-based Website. Use of graphics is excellent, navigation is superb, and it is imminently clear as to its purpose. Our support of this site is essential to bringing awareness of its efforts in finding solutions to orthopaedic problems that affect so many people." A generous grant from the **Steven and Michele Kirsch Foundation** pro-

(UPDATE cont. from pg 5)

vided the funding to develop the site. Visit our newly designed website www.shsmf.org

The Society for Technical Communications presented the Foundation with its "Distinguished Award" for the Foundation 1999 Annual Report.

Congratulations to the Clinical Research Department and Drs. Kocher and Wright. The Arthroscopy Association of North America presented the **Resident Fellow Clinical Research Award to Mininder S. Kocher, M.D.** for the paper *Determinants of Patient Satisfaction after Anterior Cruciate Ligament Reconstruction*. Co-authors included **J. Richard Steadman, M.D.**, David Zurakowski, Ph.D., **Karen Briggs, M.B.A.**, **William I. Sterett, M.D.**, and **Richard J. Hawkins, M.D.**

Former Fellow and current Steadman-Hawkins partner **John M. Wright, M.D.** was a co-recipient of The Hip Society **Otto Aufranc Award 2000** for coauthoring the research paper, *The Role of Labral Lesions in the Development of early Degenerative Hip Disease*.

Cross your fingers for Staff Scientist and lead author Mike Decker, whose paper, *Gait Re-Training of ACL Reconstructed Individuals*, is a finalist for the International Society of Biomechanics Clinical Biomechanics Award. The winner will be announced July 13. Dr. Michael Torry won this prestigious award in 1999.

Media

Look for **Discovery Channel's 21st Century Medicine** to air a special program this Fall featuring the Foundation's research. The show will feature microfracture and the Biomechanics Research Lab's virtual knee project. Producer Bob Langford remarked, "The show is about leading-edge advances in sports medicine, and the Foundation's research is where it's happening." The show will be viewed three times in the United States, shown in 17 countries, translated into 26 languages, and viewed by a total audience of approximately 140 million. ■

Education

The Eleventh Annual Fellows Meeting, held in December in Vail, brought together orthopedic surgeons who have participated in the Steadman-Hawkins Fellowship. To date, more than 110 physicians have become Steadman-Hawkins trained Fellows.

Special guest lecturer this year was **Kenneth E. DeHaven, M.D.**, Professor of orthopaedics and practices at Strong Memorial Hospital in Rochester, N.Y. Dr. DeHaven gave three presentations *Meniscus Repair, Histopathology and Surgical Outcomes of Arthrofibrosis, and Functional, Non-Operative Treatment of Achilles Tendon Rupture*.

Also presenting was **Marcus Pandey, Ph.D.**, a Professor in the Department of Kinesiology and Mechanical Engineering at the University of Texas/Austin. Dr. Pandey is one of the world's leading authorities on computer joint modeling and simulation. His presentation was entitled, *Modeling, Simulation and Analysis of the Human Gait and Clinical Applications of Knee Modeling*.



Karen Melhart demonstrates video editing and production to Eagle County fifth graders.

PHOTO: DAVID MANZELLA

In February, **Dr. Werner Mueller**, of Basel, Switzerland, visited the Foundation to conduct academic sessions on the knee and teach an anatomy class on the knee in the Foundation's Bioskills Laboratory.

The Foundation also hosted in February 40 engineering students from Colorado State University, University of Colorado, and the Colorado School of Mines.

Foundation scientists made several presentations to the engineers including a review of knee and shoulder research, human performance studies and a discussion of high tibial osteotomy by Dr. William I. Sterett. Senior Staff Scientist Kevin Shelburne, Ph.D. also presented a review of the Foundation's computerized knee modeling research.

In March, six Japanese orthopaedic surgeons visited the Foundation as part of the **Japanese Orthopaedic Academy**. They attended presentations by **Dr. Richard Steadman** on Microfracture and by **Dr. William Sterett** on High Tibial Osteotomy, and also observed Dr. Steadman in surgery.

Eagle County fifth graders spent part of a day in March touring the Steadman-Hawkins Sports Medicine Foundation. They attended presentations by Visual Services Coordinator **Karen Melhart** on video production and editing and by biomechanics research intern **Henry Ellis**. Ellis, who has been accepted to medical school at the University of Texas at San Antonio, demonstrated the Biomechanics Research Lab's motion analysis system to the students, who were then allowed to experiment with the lab's high-speed cameras and computers. ■

Foundation Hosts Japanese and U.S. Surgeons

Surgical Techniques, Education, Research Focus of Two-Day Visit



Dr. Michael Torry, left, presents joint modeling project to visiting Japanese physicians.

PHOTO: JOHN LENK

Two groups of physicians visited the Steadman Hawkins Sports Medicine Foundation last fall and winter to share knowledge on surgical techniques and observe Foundation research. Corporate sponsors Nippon Sigmax of Japan and Pfizer each sponsored two educational sessions for leading U.S. and

Japanese sports medicine physicians. According to Topper Hagerman, Ph.D., Foundation chief operating officer, the visits are part of an active education program undertaken by the Foundation, Nippon Sigmax and Pfizer. "An important part of the Foundation's mission," says Hagerman, "is to share the knowledge we generate from our research. That includes providing exposure of our leading-edge procedures to

visiting specialists. Our Japanese and U.S. visitors, each of whom is a leading orthopaedic surgeon in his own country, viewed both knee and shoulder procedures in the operating room and met to discuss the cases with Drs. Steadman, Hawkins and Sterett. We believe this kind of interface will improve international communication of these breakthrough procedures."

The visitors from Japan—Dr. Masaaki Shindo, Dr. Akira Tokuhiko, Dr. Toshiyuki Wakabayashi, Dr. Koutaro Ikeda, Mr. Jimmy Takada, director of the International Division, Nippon Sigmax Co., and Mr. Eiichi Inoue, regional manager of the Tokyo Sales Office for Nippon Sigmax—viewed two knee surgeries, the Steadman microfracture procedure and a knee procedure by Dr. Sterett called high tibial osteotomy, and a procedure by Dr. Hawkins to correct shoulder instability due to overuse or injury.

Mr. Jimmy Takada, director of the International Division of Nippon Sigmax, believes the visit will encourage the use of Steadman-Hawkins techniques in Japan. "There is", he said, "no substitute for actually meeting the man who created a technique and watching him perform it. This group is the second we have arranged for and, based on their level of enthusiasm, the program will remain one of our main educational support programs."

"Our plan," he added, "is to bring eight to ten surgeons from Japan twice a year to visit Steadman Hawkins so that their cutting-edge procedures will become better known throughout the Orient. We are eager for the next generation of sports medicine specialists to benefit from this important work."

Currently, Nippon Sigmax is issuing the invitations to surgeons in Japan, but that may change due to the popularity of the program. The Japanese Orthopaedic Academy may select candidates for upcoming visits. "We are very pleased with the response to seeing these surgical techniques in person," Takata said. "We hope the visiting surgeons, many of whom are professional team doctors, will share their experience with colleagues at home. There is much good work being done here in Vail, and Nippon Sigmax is pleased to help share that knowledge and experience."

Another important seminar was organized by the Foundation and Pfizer for 38 leading sports medicine physicians from around the country. The group was lead by Wes Wilkes, marketing director for the Pfizer World Wide Disease Management Team, and Michele Savage, vice president for Scientific Frontiers.

The surgeons observed a live "Healing Response" surgery (a non-invasive ACL repair procedure pioneered by Dr. Steadman) via cable transmission from the operating room to the Foundation's Conference Center. The surgeons also listened to presentations by Drs. Steadman, Rodkey and Fellow Michelle Cameron, M.D., on several topics, including the longterm outcomes of microfracture.

Both groups of physicians attended seminars by Dr. Michael Torry on bioengineering, by Karen Briggs on clinical research, and by Sean McEnroe on rehabilitation. They also met with the Steadman Hawkins surgical Fellows in an academic session. Said Pfizer's Wes Wilkes, "I was very pleased with the level of involvement and enthusiasm from the physicians and researchers in hosting a very successful meeting."

A SPECIAL THANK YOU TO OUR HALL OF FAME

To accomplish our mission, we depend on the support of many individuals and organizations who believe in our goals and the important research and education programs that the Foundation carries out. In 2000, we received support from 782 individuals, corporate sponsors and foundations. We would especially like to thank the following Hall of Fame Members who have generously given \$50,000 or more to the Foundation in the past year:

Herb Allen is President, Chief Executive Officer and a Director of Allen & Company, an investment banking firm located in New York City. He is a member of the Board of Directors of the CocaCola Co., Excalibur Technologies, and Global Education Network.

As chairman and CEO of Cox Enterprises, parent firm of Atlanta-based Cox Communications, Jim Kennedy has won his share of bicycling competitions. He held, for a time, the world masters record in The Bicycle Race Across America, won the World Championship in masters velodrome racing in 1996, and was national velodrome masters champion last year. The James M. Cox Foundation is a major contributor to the Steadman♦Hawkins Sports Medicine Foundation.

David Mahrer is Vice Chairman and Chief Operating Officer of American Stores Company, a \$20 billion food and drug retailer. He serves on a number of Boards including the Massachusetts College of Pharmacy and Allied Sciences Board of Trustees, the University of Colorado College of Pharmacy Advisory Board, and the University of Iowa College of Pharmacy Advisory Board. Dave has won many awards in industry including Retailer of the Year (1992) by the Institute of Retail Management. He was Chairman of a start-up company, Corner Drugstore.com, which was sold to SYMSRX in early December 2000. Dave also serves on the Board of the Steadman♦Hawkins Sports Medicine Foundation.

As a Steadman-Hawkins patient and member of the Board of Directors of the Steadman♦Hawkins Sports Medicine Foundation, Al Perkins has personally benefited from the research of the Foundation. He is the founder of Darwin Partners, a \$100 million in revenues human capital strategies firm specializing in information technology research and management consulting. Additionally, Al is the founder and chairman of the Fish House Foundation, a non-profit scholarship foundation for promising Massachusetts and New Hampshire college students.

Larry Ruvo is well-known in the Las Vegas Community for supporting numerous philanthropic causes. As Senior Managing Director of Southern Wine and Spirits of Nevada since 1969, he has guided the company to become Nevada's largest wholesale liquor, wine and beer importer and distributor. In 1999, he received the National Community Leadership Award from the Points of Light Foundation and Man of the Year Award from the University of Nevada/Las Vegas.

We appreciate your support!

(PATIENTS IN THE NEWS cont. from pg 1)

Joan Birkland

they coach throwing the ball out in front of you, which is no doubt helping to ensure the longevity of a lot of younger competitors.”

After years of competitive tennis (she has played the game her entire life), Birkland showed up at the doorstep of Steadman-Hawkins in 1992 with a torn rotator cuff, an injury she suffered while skiing. Dr. Hawkins did the repair and cautioned Birkland, then 62, “You know, Joan, you don’t have the shoulder of a 25-year-old.” Birkland’s reply: “I know that—how about 29?” Not one to let a little rehab get in the way, Birkland continued her blistering pace of competitive tennis and

golf—then paid Dr. Hawkins another visit in 1996, this time for the same problem, a torn rotator cuff, but this time determined to give her injury the proper respect. Says Birkland today, “Knock on wood, my shoulder feels great.”

Dr. Hawkins’ reputation for shoulder repair wasn’t the only reason Birkland returned. She also liked the Steadman-Hawkins staff. “They’re all so young and vital and interested. They made me feel as if I were going to be well right away. I was astounded. A sense of determination, commitment and enthusiasm carried through the entire clinic. It was the most upbeat place to be.” She also had a chance to observe the research the Foundation staff was doing on pro golfer Greg Norman and his shoulder problems—“and that absolutely fascinated me. I found there are ways not to injure your shoulder and ways to build up your muscles to protect it. Those are the exercises they gave me.”

What Birkland learned at Steadman-Hawkins—lessons for any athlete, at any age—was the value of stretching and exercise, especially as it protects and benefits your game as you get older. “The huge turnaround, especially in women’s sports,” says Birkland, “is that athletes now know the value of getting in shape, especially by working on upper body strength.” Birkland’s regimen? She works out at least three times a week—aerobics, weightlifting, and stretching sessions with the Sport Cord. The inevitable question of someone who’s played at the top levels in golf and tennis: which sport do you prefer? “I’m always asked that,” says Birkland, “and my answer always depends on which friends—tennis or golf—I’m talking to. The best thing about golf is that you don’t have to play with people of the same ability, and you can have just as much fun. In tennis, you pretty much have to stay within your own ability group. Frankly, I love both—but with my shoulder, and at my age, I figure I better start getting good at golf again.”

And shaving that handicap to a 5. ■

(SAVE YOUR ROTATOR CUFFS cont. from pg 1)

tors stabilize the highly mobile shoulder girdle and are critical during all phases of the golf swing. When Ernie Els tries to drive a 300-yard hole, it’s the rotators that keep his arms from taking flight along with the ball.

Although the rotators are separate muscles than the shoulders, it’s during deltoid-moving activities that you’ll feel them. The most common shoulder-related injuries are rotator cuff strains or tears, but it’s rare for a rotator cuff to blow out suddenly. A more likely culprit is constant or repetitive stress, such as spending an hour every day at the driving range (especially if using poor technique). Injure your rotator cuff and you can say good-bye to swinging a golf club.

Full-body conditioning is essential to rotator health. Poor flexibility and strength will lead to improper hip and trunk rotation. That, in turn, leads to overcompensation of smaller, weaker muscles of the arms and shoulder, and that is a sure road to injury. Before long, it might be a struggle to wash your hair with both hands. As for golf... forget it! In case you’re not a fan of the gym, the stretches and exercises below can be performed anywhere—at home, at the office—with little or no equipment. The key is consistency: Try to stretch every day, and train for strength three times a week.

Stretches

If short on time, get creative: stretch in bed, in the shower, during work breaks. Perform active stretching—body squats, shoulder circles, hip and side bends, trunk twists—as part of your golf warm-up. Some active stretches can also double as strengthening exercises. Static stretching, which involves gently easing and holding muscles past their normal range of motion, like the toe touch, is best done as part of a cool down after exercising. Hold static stretches for 20-30 seconds, then repeat and try to push a little farther.

Arm Swing (Easy):

An active stretch is great for warmup. Stand with feet shoulder-width apart, arms at sides and palms facing behind you. Raise right arm in front of you until it is directly overhead. While lowering right arm, raise left arm. Swing arms gently 10-12 times apiece, alternating them in a steady, controlled manner.



Cross Arm Push

Stand with feet shoulder-width apart or sit with an erect posture. Take the right hand and place it on the left shoulder. Next, take the left hand and place it on the right elbow. Attempt to push on the elbow and force the right hand down the back. This will stretch the back of the

right shoulder. Allow the “end point of comfort” to be your guide and repeat by going in the opposite direction. Hold the position for five to ten seconds and repeat the stretch for three to five repetitions. (Repeat with other arm).

Strength Exercises

Warm up beforehand with 5-10 minutes of cardiovascular exercise and active stretches. For rotator cuff drills, start with extremely light weight—a soup can or one-pound dumbbell is fine—and do one set of 12 repetitions per exercise for each workout. Progress to three sets of 12-15 for each exercise per workout, never lifting more than 5 pounds in each arm. Using heavier weights will engage the larger muscles and leave the rotators dormant and weak. Work at a steady and controlled pace through a full range of motion.

Breathe out during exertion/contraction phase of these exercises; breathe in during return to starting position. Tighten the abs during resistance exercises to create a natural girdle that helps support and protect the lower back. The body is a machine—every part affects the others—so condition all muscles: legs, hips, back, abs, chest, shoulders and arms. Perform cross-training drills in the water and with the Sport Cord.



External Rotation (Easy) Using Sport Cord:

Attach Sport Cord to a door at mid level using the door knob attachment. Step away from the door until the cord is taut, with your resting shoulder toward the door. Stand with the feet shoulder

width apart, holding the handle in the exercising hand at hip level, with the exercising arm across the body. Begin a slow external or outward rotation of the forearm while keeping the elbow stationary at the hip to 90 degrees. Return slowly to the start position. (Repeat with other arm).



Internal Rotation (Easy) Using Sport Cord:

Attach Sport Cord to a door at mid level using the door knob attachment. Step away from the door until the cord is taut, with your exercising shoulder toward the door. Stand with the feet shoulder width apart, holding the handle in the exercising hand at hip level.

Begin a slow internal or inward rotation of the forearm while keeping the elbow stationary on the hip. Return slowly to the start position. (Repeat with other arm).



Upright Row (Moderate):

While standing with feet together on the Sport 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 towards 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.



Forward Punch.

Attach the Sport 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. Holding a handle in each hand, start with the arms at waist level, hands starting at the sides of the body, and the elbows bent. Slowly punch forward while extending the arms. Simulate a straight-out punching motion. Repeat the exercise.

Seated Row.



Attach the Sport Cord to a door at mid-level using the door-knob attachment. Sit in a chair placed six to seven feet away from the door (facing the door). Feet should be in a wide flat-footed position and your lower back should be flat against the

chair back. Hold a handle in each hand, with arms extended and hands almost together at waist-level in front of the body. Slowly pull arms back (keeping them at the same level) in a rowing motion until the hands reach either side of the chest. Slowly return to starting position. Repeat.

Healthful Tips

Base swing intensity on your level of golf fitness. Just like a beginner in the weight room shouldn't push 100 percent for at least a month, the same applies to a newcomer or recent returnee to the golf course.

Even with impeccable form, be wary of overworking on the practice range.

Know your limits. Very few people, even at peak condition, can attack the ball like the hardest-hitting pros without harsh physical consequences. If we hit like Tiger Woods, most of us would end up in the hospital.

Consult with your doctor before starting any exercise program. ■

For further information on the Sport Cord, log on to www.toppersportsmedicine.com or call 800-250-3779.

(RESEARCH UPDATE cont. from pg 1)

tains stem cells that can turn into ligament, cartilage or tendon if the proper environment is provided. Most of our efforts, to date, have concentrated on providing the correct mechanical environment for the healing tissue, such as a continuous passive motion machine to stimulate cartilage repair. In addition, we have occasionally tried to insert a nearby graft, or graft from a tissue bank, into the defect.

Now, however, Foundation researchers have three exciting areas to explore to improve healing. The first method is to add “cytokines and growth factors” to the healing bed. The second is the collection and delivery of additional stem cells to the healing bed. And the third method is to provide additional positive genetic stimulation to the healing tissue. The latter two methods will be described in detail in a future edition of this newsletter. For now, here’s what we’ve found concerning cytokines and growth factors.

Growth factors belong to a general class of cell-derived protein or glycoprotein (protein plus carbohydrates) molecules. Proteins and glycoproteins are made up of building blocks called amino acids, which are put together in a specific sequence to determine which cytokine growth factor is created. The amino acids are linked together in a long chain, but the chain is folded so that the cytokine growth factor has a three-dimensional shape quite different than the chain. The sequence of the chain that is produced is determined by the gene of the cell that has created the growth factor.

Some growth factors will stimulate undifferentiated cells in the blood or blood clot of injured tissue to turn into, or “differentiate” into, the type of cell that needs to be formed to heal an injury. Others will stimulate cells to become more active when they have differentiated. For example, bone morphogenetic protein (BMP) can stimulate undifferentiated cells in the blood clot formed by the microfracture procedure (performed by punching holes in the defective cartilage to stimulate a blood clot) to turn into new cartilage cells. On the other hand, transforming growth factor- β (TGF- β) will stimulate the new cartilage cell to become more active to produce new cartilage around it, thus stepping up the production of the sponge-like cushion material surrounding the cells.

During our lifetime, our cells will normally replenish small defects (“divots”), tears, or cracks in our matrix tissue. This will occur in bone, where the matrix is hard, in cartilage, where the matrix is softer (like Tupperware), or in ligaments, where the matrix is even softer (like rope). This process is called “turnover.” If our bodies did not continue correcting “micro-damage” from the normal wear and tear of life, we would rapidly deteriorate. And the proteins that tell the cells what to do are the cytokines and growth factors. Thus, they not only “work

overtime” when major damage has occurred and blood clots full of undifferentiated cells need to be turned into healed tissue, but they work at a slower rate to stimulate normal turnover of tissue where no serious injury or bleeding has occurred.

Cytokines and growth factors are considered “signaling” proteins because they tell the cells what to do. Structural proteins, on the other hand, are proteins produced around the cells that give the hard texture to bone or the “Tupperware” character to cartilage. For example, there are signaling proteins that tell the cells to break down tissue matrix and replace it because it has been there too long. In the case of healthy resting cartilage, the locally produced cytokine growth factors FGF (fibroblast growth factor) and IGF 1 (insulin like growth factor 1) most likely maintain normal matrix turnover.

Other signaling proteins will tell cells to increase their production of matrix proteins such as TGF- β . The signaling proteins are therefore present at all times—and functioning in tissue, but they are produced in higher quantities during injury and repair. Cytokine growth factors thus stimulate many different normal cell activities that are consistent with the central role in the control of tissue turnover, be it developmentally programmed, constitutive or unscheduled (tissue healing).

All cytokine growth factors act in an “autocrine” or “paracrine” manner, as opposed to an “endocrine” manner. Endocrine factors are hormones that are produced in one part of the body (such as a gland), and have target functions far away in another part of the body. Cytokine growth factors, on the other hand, are produced by cells reading an environmental change, such as injury, and they release “clean up” factors as well as “repair” factors locally. They stimulate themselves (“autocrine”) or neighboring cells (“paracrine”). They travel between the cells and then bind to a specific cell surface receptor. Once the binding occurs, the cell responds in a preprogrammed way for that particular factor. The interactions are sometimes complex with a feedback loop to stop the stimulation once the effect has been produced.

As we move into the 21st century, it appears that we will be able to isolate, purify and manufacture various cytokines and growth factors. The complete amino acid sequences and the DNA coding sequences for many of the cytokine growth factors are known. By injecting these cytokines or growth factors at the right time in an injured area, or by placing them in a time-release delivery material, it will be possible to improve the healing of damaged tissue. Several animal experiments have already been performed with growth factors produced in the laboratory that have demonstrated significant improvement of cartilage and ligament healing. Foundation research will help to determine when to start the cytokine or growth factor administration, and when to stop. The potential for improved repairs is enormous. ■

BASEBALL PITCHING AND SKELETAL STRESS

Pitching biomechanics may have role in determining skeletal structure

Implications for Little League pitchers: benefit or risk?

Michelle B. Sabick, Ph.D.

Senior Staff Scientist, Biomechanics Research Laboratory



PHOTO: JOHN KELLY

Clinicians working with amateur and professional baseball players have long observed that pitchers can externally rotate their throwing shoulders much more than non-throwing athletes. The increased range of motion (ROM) of the throwing shoulder was thought to develop due to the repetitive stresses on the throwing shoulder over time. Specifically, it was thought that the soft tissues in the front of the shoulder were stretched every time a pitcher cocked his or her arm during the throwing motion. Over time, this would eventually lead to the soft tissues

and supporting structures in the front of the shoulder becoming loose and allowing more shoulder external rotation during the arm cocking motion.

Recently, clinicians and researchers have discovered that the soft tissues around the shoulder are not the only structures forced to adapt to the stresses of pitching. In fact, the increase in external rotation seen in pitchers may be due in part to bony changes as well as soft tissue changes. Measurements of the shape of the humerus using computer tomography (CT) scans have shown that the bone of the upper arm is more twisted in the dominant arms of pitchers than in their non-throwing arms. The angle between the axis of the elbow joint and the humeral head, called the torsional angle of the humerus, is the measure of humeral twisting about the long axis of the bone. This angle is thought to change due to the repetitive stresses of the throwing motion in baseball pitchers. However, the mechanism by which this change occurs, and what triggers it, is not yet understood. In addition, it is not clear whether bony adaptations are beneficial to pitchers, or are likely to result in injury in the future.

Bone is known to adapt to the stresses it encounters. For example, the bones in the dominant arms of professional tennis players are larger and stronger than the bones in their non-dominant arms, presumably due to the stresses applied during play. Therefore, adaptations of the humerus to the stresses of pitching are feasible, and may produce changes in bony geometry. If this is the case, the biomechanics of the pitching motion are likely to result in the stresses that cause the changes in the torsional angle of the humerus.

The large shoulder and elbow forces generated during the pitching motions of both adult and young pitchers have been well documented.

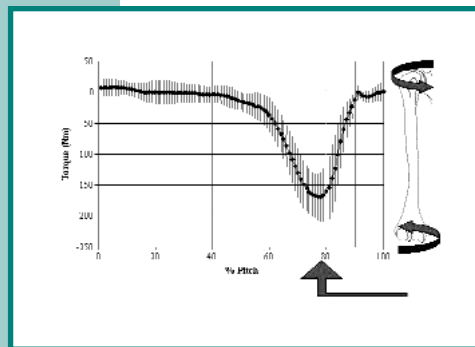
However, the relationship between pitching biomechanics and changes in humeral shape has not been investigated. Understanding the portions of the pitching motion that cause stress in the shoulder will help coaches and clinicians minimize detrimental skeletal adaptations to decrease the likelihood of injury in pitchers, as well as help to guide treatment and rehabilitation procedures in baseball pitchers of all ages.

To this end, the Foundation's Biomechanics Research Laboratory has established several research projects investigating the relationship between the forces acting on the shoulder when pitching, and the effect these forces may have on the skeleton. In a recent study of 25 professional baseball pitchers participating in spring training, we calculated the amount of torque, or twisting force, acting on the humerus during the pitching motion. The results are shown in Figure 1. Just before the end of the cocking phase of the pitch, the torque tending to twist the humerus about its long axis peaks. The direction of this torque is such that the elbow end of the humerus is twisted outward relative to the shoulder end, a direction that is consistent with the changes in bony shape that are measured using CT. This large torque occurs due to the whipping motion that the arm is undergoing at this point in the pitch. Therefore, the pitching motion appears to generate the types of forces necessary to cause the humerus to twist over time.

More work remains to be done to relate the torque acting on the humerus to clinical signs or symptoms, such as shoulder instability or likelihood of sustaining a rotator cuff tear. However, this data provides the first indication that pitching biomechanics likely has a role in determining skeletal structure. In

the next phase of this project, we plan to investigate whether changes in the humeral torsion angle occur before skeletal maturity, when the soft cartilage of the growth plates may be twisted by the forces of throwing. This study may have implications for Little League pitchers, whose skeletons are likely the most susceptible to the forces generated during a pitch. Specifically, it is not clear whether changes in the geometry of the humerus will

be beneficial to young pitchers, or instead will predispose them to injuries that may shorten or end their pitching careers. This research project aims to answer some of these questions and help provide recommendations that will help young pitchers achieve their potential. ■



Torque acting on the humerus during the pitching motion. Just prior to the end of the cocking phase of the pitch, there is a large torque tending to twist the humerus about its long axis, as demonstrated in the diagram.

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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Mark Your Calendar

August 18, 2001

Invitation to the Dance. A gala dinner, wine auction and dance, the Larkspur Restaurant at Vail. For more information, call Holly Horvath, (970) 479-5788 or via E-Mail holly.horvath@shsmf.org

December 5-8, 2001

Eleventh Annual Steadman◆Hawkins Fellows Meeting. The Lodge at Vail, Vail, Colorado. For more information, call Holly Horvath, (970) 479-5788 or via E-Mail holly.horvath@shsmf.org

February 2-3, 2001

Fifth Annual Steadman◆Hawkins All-Star Classic Ski Race, Vail, Colorado. For more information, call John McMurtry, (970) 479-5781 or via E-Mail john.mcmurtry@shsmf.org

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