

STEADMAN PHILIPPON RESEARCH INSTITUTE

2011 Annual Report



An International Center For Research and Education – Keeping People ActiveSM

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The Institute wishes to express again deep appreciation to John P. Kelly, who donated many of the stock photos in this year's Annual Report and contributed his time to photograph the many Institute and operating room subjects.

John Kelly first picked up a camera while serving as an infantry lieutenant in the Air Cavalry in Vietnam. He quickly developed a love for photography that he took home with him to Colorado. By combining his new craft with his passion for sports and adventure, Kelly created a successful career.

His diverse photo assignments have taken him from Wimbledon to trekking the Himalayas, the Winter Olympics to sailing the Caribbean. He was the official photographer for the U.S. Open Golf Championships for 10 years, and the only American among the official photographers at the Lillehammer Winter Olympic Games. When Robert Redford needed the defining shot to promote his film "A River Runs Through It," he called on Kelly. Subsequently, he also provided the still photography for Redford's "The Horse Whisperer."

Although he has traveled all over the world, many of his favorite photo shoots have taken place at his beloved End of the Road Ranch in Western Colorado, where clients such as Polo/Ralph Lauren have come to work and play with Kelly and his friends and animals.

Mission

The Institute is dedicated to keeping people of all ages physically active through orthopaedic research and education in the areas of arthritis, healing, rehabilitation, and injury.

History

Founded in 1988 by orthopaedic surgeon Dr. J. Richard Steadman, the Steadman Philippon Research Institute is an independent, tax-exempt (IRS code 501(c)(3)) charitable organization employing scientists, researchers, fellows, visiting scholars, and interns. Dr. Steadman moved to Vail in 1990 with one researcher. Today, there are almost 30 employees (scientists, researchers, medical fellows, visiting scholars, administration, and interns). In 2010, Dr. Marc Philippon's name was added to mark the succession of the Institute and recognize his research efforts and contributions to the field of hip arthroscopy.

Funding for research and education programs comes primarily from public donations and fundraising events (grateful patients and the physicians of the Steadman Clinic), corporations, and competitive grants.



The Institute is known throughout the world for our research into the causes, prevention, and treatment of orthopaedic disorders. We are committed to solving orthopaedic problems that limit an individual's ability to maintain an active life.

Our research perspective is based on clinical relevance, with a goal of improving the care of the patient. Recognizing that the body's innate healing powers can be harnessed and manipulated to improve the healing process has led to exciting advances in surgical techniques developed by Dr. Richard Steadman and validated at our Institute. Today, the Institute is recognized worldwide for Dr. Marc Philippon's pioneering research in the treatment of sports-related injuries to the hip.

Athletes are becoming bigger, faster, and stronger. Unfortunately, their connective tissue does not. Therefore, injuries are becoming more complex. Our research into the

anatomy and mechanisms of the complex knee, hip, and shoulder is being recognized worldwide.

We collect data and publish clinical research results on knees, hips, shoulders, spines, feet and ankles, and hands and wrists, and work to improve imaging techniques. Through these efforts, SPRI has become one of the most published and innovative organizations in sports medicine research and education. We publish our findings in relevant peer-reviewed scientific and medical journals, and present our research results at medical meetings worldwide.

Philanthropic gifts are used to advance scientific research and to support scholarly academic programs that train physicians for the future. Through our fellowship and visiting scholar programs, the Institute has now built a network of more than 185 Fellows and Visiting Scholars worldwide who share the advanced ideas and communicate the concepts they learned in Vail to their patient base.

Our primary areas of research and education are:

- **Center for Translational and Regenerative Medicine Research** – undertakes biological studies at the cellular level to investigate the causes and effects of degenerative arthritis, techniques of cartilage regeneration, and basic biological healing processes.
- **Center for Outcomes-Based Orthopaedic Research** – conducts outcomes-based research using actual clinical data that aids both physicians and patients in making better and more-informed treatment decisions.
- **Surgical Skills Laboratory** – is equipped to implement new surgical technologies and train surgeons in new techniques.
- **BioMedical Engineering** – studies dynamic joint function using motion analysis, computer modeling, and dual-plane fluoroscopy imaging to understand injury mechanisms and to enhance rehabilitation techniques and outcomes.
- **Imaging Research** – develops and evaluates noninvasive imaging techniques of the joints for the purpose of directing and monitoring clinical treatment and outcomes, and to enhance the clinical relevance of biomechanics research.
- **Education and Fellowship Program** – administers and coordinates the physicians-in-residence fellowships and visiting scholars programs, hosts conferences and international medical meetings, and produces and distributes publications and teaching visual media.

The Year In Review

DEAR FRIENDS,

We are writing to personally thank you for your tremendous support during this past year. We look back at 2011 and 2012 as a period of significant change, enormous productivity, increased efficiency, and exciting promise for the Steadman Philippon Research Institute. The productivity and accomplishments of SPRI are at record levels, as measured by publications in high-impact journals, presentations at high-impact meetings, our strategic worldwide corporate partnerships, and our exciting prospective collaborative initiatives. The above have occurred because of the dedication, integrity and energy of our scientists, physicians, researchers, fellows, interns and staff. Because of individual philanthropy and corporate support, we experienced the third consecutive year of record contributions.

Because of the generosity from the Gildor Foundation, new areas of shoulder and sports medicine research were opened. In this report, you will also read about a new and innovative Imaging Research scholarship established by the Kenneth and Anne Griffin Foundation, the *Griffin Visiting Scholar Program for Clinical Sports Medicine MRI* (Page 8).

A landmark study of a procedure developed by Dr. Steadman was completed and will have a significant worldwide impact on the treatment of degenerative arthritis. "Ten Year Survivorship Following Knee Arthroscopy in Patients with Moderate to Severe Osteoarthritis of the Knee." This research focused on an arthroscopic treatment package for patients who have osteoarthritis, but are not ready to change their activity level or proceed to total knee replacement. The research concluded that a large number of patients could delay total knee replacement for 10 years. For this breakthrough research, Dr. Steadman was honored in May 2012 with the Richard O'Connor Research Award by the Arthroscopy Association of North America.

In 2011, we opened the Surgical Skills Laboratory, which is one of the most advanced laboratories in North America. Thanks to many generous contributions from private donors and industry, as well as our continued partnership with Vail Valley Medical Center, the SPRI laboratories are at the peak of advancing orthopaedic medical education. The new Surgical Skills Laboratory has been off to a great start. We have hosted several different labs for visiting surgeons, scholars, fellows, and medical companies.

The newly named Department of BioMedical Engineering and the Center for Outcomes-Based Orthopaedic Research, as well the Center for Translational and Regenerative Medicine Research initiated and completed a record number of research studies. These studies have produced scholarly articles published in peer-reviewed journals, presentations made at national and international conferences, and recognition for the physicians and scientists at SPRI at unparalleled rates.

The volume and quality of our research is measured not only by stringent scientific standards, but also by the respect accorded to the Institute by the general public. The generosity of our donors has provided the platform for SPRI to be among the leaders in the number of high-impact articles published in peer-reviewed national and international journals. As a result, our scientists are regularly invited to participate as lead speakers in national and international high-impact conferences.

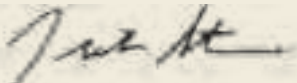
This past year, more than 150 young orthopaedic surgeons applied for nine available one-year sports medicine fellowships offered and administered by SPRI. Visiting international scholars who want to specialize in sports medicine research came from all over the world to observe, assist in research, and work in our Surgical Skills Laboratory. Please read about Dr. Frank Martetschläger (page 46), our 2011-2012 Arthrex European Visiting Scholar from the University of Würzburg in Germany.

Although our accomplishments to date have been significant, there are opportunities for SPRI to have an even greater impact. As we look forward to our 25th year in 2013, we plan to add new programs and departments (injury prevention, for example), bring in additional physicians and scientists, and sharpen our focus. We will be applying for designation by the International Olympic Committee as a certified IOC Research and Teaching Center. At this time, there are none in the United States. SPRI would be the first.

The goal of our physicians/scientists/leaders is to become the number one orthopaedic clinic and sports medicine research institute in the world. The only things that can prevent this from happening are money and space. With funding from an increased emphasis on individual philanthropy, combined with corporate sponsorships, federal contracts, and grants, our potential is unlimited.

We wish to express our appreciation to all of our patients and friends who have been so generous and who have made it possible for the Steadman Philippon Research Institute to become a world leader. We look forward to your continued support as we pursue our mission of keeping people active through orthopaedic research and education.

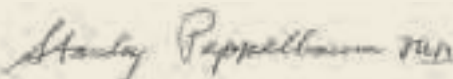
Respectfully yours,



J. Richard Steadman, M.D.



Marc J. Philippon, M.D.



Stan Pappelbaum, M.D., M.B.A.



J. Richard Steadman, M.D.



Marc J. Philippon, M.D.



Stan Pappelbaum, M.D., M.B.A.

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Norm Waite

Vice President
Booth Creek Management Corporation
Vail, Colo.

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Institute
Vail, Colo.

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Washington, D.C.

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Vail, Colo.

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Vice President, Program Advancement



Earl Graves, Sr., Presented With Lifetime Achievement Award by the Steadman Philippon Research Institute

By Jim Brown, Executive Editor, *SPRI News*

On July 5, 2012, the Steadman Philippon Research Institute and its Board of Directors presented the first ever Lifetime Achievement Award to Earl Graves, Sr. His youngest son, Michael, accepted the award on behalf of Mr. Graves and his recently deceased wife, Barbara.

Mr. Graves is one of the nation's most successful and distinguished business leaders. He serves on the Institute's Board of Directors and has raised hundreds of thousands of dollars for the Institute during his 15-year tenure. The Board also named Mr. Graves a Lifetime Trustee of the Institute.

Speaking for SPRI and the Board, Dr. Richard Steadman and Dr. Marc Philippon said, "We at the Steadman Philippon Research Institute are proud to recognize Earl Graves as the first recipient of the Steadman Philippon Research Institute's Lifetime Achievement Award. We are honored to have this association. He has been an active member and we hold him in the highest esteem."

Mr. Graves is chairman and chief executive officer of Earl G. Graves, Ltd, the parent corporation for the Earl G. Graves Publishing Company. His company publishes *BLACK ENTERPRISE*, a business-service magazine targeted to black professionals, executives, entrepreneurs, and policy makers in the public and private sector. *BLACK ENTERPRISE* has a circulation of over 425,000 and a readership of more than 3.8 million.

From Brooklyn to Morgan State to the Green Berets and Beyond

Born in Brooklyn, Mr. Graves was a ROTC graduate with a degree in economics from Morgan State University. He attended Airborne and Ranger School and finished his Army service with the rank of Captain in the 19th Special Forces Group—the Green Berets.

Mr. Graves began his career as an administrative assistant to the late Senator Robert F. Kennedy from 1965 to 1968. After Senator Kennedy's assassination, Mr. Graves formed his own management consulting firm to advise corporations on urban affairs and economic development.

He served as chairman and CEO of Pepsi-Cola of Washington, the largest minority-controlled Pepsi-Cola franchise in the United States, and he continues to serve as chairman

of Pepsi's Customer Advisory and Ethnic Marketing Committee.

The Graves-Steadman Connection

"I had a series of knee injuries over a long period of time," says Mr. Graves, who had been going to Colorado with his family to ski for many years. "Someone mentioned to me that there was an orthopaedic group in Vail called The Steadman Clinic and a doctor named Richard Steadman. I looked him up, got an evaluation and later, treatment, and the rest is history."

Mr. Graves' son, Earl Graves, Jr., says about his father, "Our father has always been the kind of person who wanted to 'give back' and work in the not-for-profit business sector. He loved Dr. Steadman, liked what the Institute was doing and how it helped people, and he loved skiing. It was a perfect storm."

Earl Graves, Sr., was a close friend of the late Secretary of Housing and Urban Development Jack Kemp, who encouraged him to get involved with the Steadman Philippon Research Institute and its Board of Directors. Secretary Kemp served on the SPRI Board of Directors until his death in 2009.

In addition to his contributions to SPRI, Mr. Graves served as a director of Aetna Life and Casualty Company, The Schomburg Center for Research in Black Culture, AMR Corporation (American Airlines), DaimlerChrysler AG Corporation, Federated Department Stores, Inc., and Rohm & Haas Corporation. He also serves as a volunteer on boards of TransAfrica Forum and the American Museum of Natural History and Planetarium.

Life-Changing Experience

"Being treated by Dr. Steadman was a life-changing event for me because it helped to heal a lifetime problem, just as it has for people in all walks of life," says Mr. Graves. "There is something to be said for a person who is at the top of the medical profession for all the right reasons."

"The Clinic and the Research Institute have been on the cutting edge of medical science," he continues. "When I had my first knee surgery decades ago (long before I met Dr. Steadman), surgeons had to open up the entire knee with very invasive surgery. Because of the work they've done here, surgical procedures are now much less invasive and



the recovery time is much quicker. The fact that people from all over the world come here for treatment is a testimony to the research that has been conducted at SPRI."

Speaking of the Steadman Philippon Research Fellows, Mr. Graves says, "It's clear that it is an honor to be selected to come and work at the Steadman Clinic and the Steadman Philippon Research Institute. SPRI has world-renowned facilities and physicians who train these young doctors to care for and help people. The success that SPRI has had should not be a surprise. It attracts the best and brightest medical minds."

Higher Education, Equal Opportunity

Mr. Graves is a staunch advocate of higher education and equal opportunity. In recognition of his support of entrepreneurial education, Morgan State University renamed its School of Business and Management to the Earl G. Graves School of Business and Management.

Mr. Graves is a member of the National Black College Hall of Fame and has lectured at Yale University. He has been awarded honorary degrees from 51 universities, including his alma mater.

Mr. Graves currently resides in Westchester County, New York. He and his late wife, Barbara, have three married sons, Earl, Johnny, and Michael, and eight grandchildren.

Scientific Advisory Committee

THE SCIENTIFIC ADVISORY COMMITTEE CONSISTS OF DISTINGUISHED RESEARCH SCIENTISTS WHO REPRESENT THE INSTITUTE AND SERVE AS ADVISORS IN OUR RESEARCH AND EDUCATIONAL EFFORTS, IN OUR FELLOWSHIP PROGRAM, AND TO OUR PROFESSIONAL STAFF.

Steven P. Arnoczky, D.V.M.

Director
Laboratory for Comparative
Orthopaedic Research
Michigan State University
East Lansing, Mich.

Stephen S. Burkhart, M.D.

The San Antonio Orthopaedic Group
San Antonio, Texas

Lars Engebretsen, M.D., Ph.D.

Professor
Orthopaedic Center
Ullevål University Hospital and Faculty
of Medicine
University of Oslo and Oslo
SportsTrauma Research Center
Oslo, Norway

John A. Feagin, M.D.

Emeritus Professor of Orthopaedics
Duke University
Durham, N.C./Vail, Colo.

Troy Flanagan, Ph.D.

High Performance Director
U.S. Ski and Snowboard Association
(USSA) Center of Excellence
Park City, Utah

Charles P. Ho, Ph.D., M.D.

Director
Imaging Research
The Steadman Philippon Research
Institute
Vail, Colo.

Bryan Kelly, M.D.

Hospital for Special Surgery
New York, NY

Mininder S. Kocher, M.D., M.P.H.

Assistant Professor
Orthopaedic Surgery
Harvard Medical School,
Harvard School of Public Health
Children's Hospital, Boston, Department
of Orthopaedic Surgery
Boston, Mass.

Robert F. LaPrade, M.D., Ph.D.

Director
Biomechanics Research Laboratory
The Steadman Philippon Research
Institute, The Steadman Clinic
Vail, Colo.

C. Wayne McIlwraith, D.V.M., Ph.D.

Director
Orthopaedic Research Center and
Orthopaedic Bioengineering
Research Laboratory
Colorado State University
Fort Collins, Colo.

Peter J. Millett, M.D., M.Sc.

The Steadman Clinic
Vail, Colo.

Marc J. Philippon, M.D.

The Steadman Clinic
Vail, Colo.

William G. Rodkey, D.V.M.

Chief Scientific Officer
Center for Translational and
Regenerative Medicine Research
The Steadman Philippon Research
Institute
Vail, Colo.

J. Richard Steadman, M.D.

The Steadman Clinic
Vail, Colo.

John JP Warner, M.D.

Harvard University
Boston, Mass.

**Savio Lau-Yuen Woo, Ph.D., D. Sc.
(Hon.)**

Ferguson Professor and Director
Musculoskeletal Research Center
University of Pittsburgh
Pittsburgh, Pa.

Dr. J. Richard Steadman receives the Richard O'Connor Research Award



Jonathan B. Ticker, M.D., Chair of the Research Committee for the Arthroscopy Association of North America, presents the Richard O'Connor Research Award to Dr. Richard Steadman.

Dr. J. Richard Steadman was honored in May 2012 with the Richard O'Connor Research Award. Dr. Steadman, internationally known for his work as an orthopaedic knee surgeon, received the award for the research paper titled "Ten Year Survivorship Following Knee Arthroscopy in Patients with Moderate to Severe Osteoarthritis of the Knee." Dr. Steadman developed this arthroscopic treatment package for patients who have osteoarthritis but are not ready to change their activity level or proceed to total knee replacement. This paper showed that a large number of patients could delay total knee replacement for 10 years. His co-authors are Karen Briggs, Lauren Matheny, and Dr. Henry Ellis. Dr. Steadman's presentation and many others were highlighted at the Arthroscopy Association of North America's 31st Annual Meeting in Orlando, Florida, May 17-18.

Kenneth and Anne Griffin Foundation Grants \$200,000 to Support Visiting Scholar Program for Clinical Sports Medicine MRI



Kenneth C. Griffin

The Steadman Philippon Research Institute is pleased to announce a \$200,000 grant award from the Ken and Anne Griffin Foundation to support the Griffin Visiting Scholar Program for Clinical Sports Medicine MRI.

Mr. Griffin, a former Steadman Clinic patient and long-time supporter of SPRI's research efforts, is founder and chief executive officer of Citadel, LLC, a franchise that includes both Citadel Asset Management and Citadel Securities. Citadel is one of the most successful financial institutions in the world.

Mr. Griffin is a graduate of Harvard and an active supporter of educational, civic, cultural, and evidence-based medicine initiatives. He serves on the Board of Trustees for both the Art Institute of Chicago and the Museum of Contemporary Art, as well as the Board of Directors of the Chicago Public Educational Fund. Within the business community, he is a member of numerous organizations, including the World Economic Forum, G100, and the Economic Club of Chicago.

"Ken Griffin has always been a supporter of the Institute, and he has taken a special interest in imaging research," says Charles Ho, M.D., Ph.D., Director of Imaging Research at SPRI. "He has followed the progress of Imaging Research and its collaboration with Siemens Medical Solutions USA as the department expanded in areas of imaging biomarkers, mapping, and the clinical imaging database. When the Institute's Imaging Research Fellowship sponsorship by Siemens was scheduled to expire, Ken took up the challenge and committed to sponsoring the Visiting Scholar Program for the next two years."

"This is an important opportunity to support the most advanced and innovative work in rehabilitation, imaging and research today," said Mr. Griffin. "As someone who has benefitted from the Institute's work, I

am proud to support the SPRI team and its mission."

The process of identifying and recruiting the first Griffin Visiting Scholar has already begun, and the physician who is selected for the position will begin his or her work in 2013. That person will read and review clinical patient MRI exams, assist in developing and validating sports medicine MRI protocols and scoring systems, and collect imaging data to be incorporated into SPRI's existing clinical and operative database.

"In addition to evaluating and analyzing the imaging database and correlating it with the clinical database and outcomes, the Visiting Scholar will also write and submit articles to be considered for publication in peer-reviewed journals," adds Dr. Ho.

"The Visiting Scholar will have the unique opportunity of correlating the results of imaging, clinical exams, arthroscopy and operative results, and outcomes. Following patients from day one to final outcomes is an experience that would be difficult to get anywhere else," says Dr. Ho.

"On behalf of the Steadman Philippon Research Institute and the department of Imaging Research," concludes Dr. Ho, "I want to express our appreciation to the Kenneth and Anne Griffin Foundation for making this Visiting Scholar Program possible. Their philanthropic generosity will greatly enhance our research and education mission, and this award will undoubtedly help us advance evidence-based medicine and science."

FRIENDS OF THE INSTITUTE



In 2011, SPRI received 1,017 separate gifts and corporate support from 755 individuals, foundations, and corporations. This combined support, including special events, amounted to \$8,437,812. The Institute is grateful to the following individuals, corporations, and foundations for their support of the Institute in 2011. Their vision ensures the advancement of evidenced-based medical research and joint preservation research, science, and care, as well as the education of physicians, for the future. We extend our gratitude to these individuals for their generous support.

1988 Society *Lifetime Giving*

On November 9, 1988, the Institute was incorporated as a not-for-profit educational and research organization dedicated to advancing modern medical science and the education of young physicians. The Institute is deeply grateful to the following members of the distinguished 1988 Society, whose cumulative giving totals \$1 million or more.

Mr. Herbert Allen

Arthrex, Inc.

Mr. Ephraim Gildor

Mr. and Mrs. George N. Gillett, Jr.

Mr. Kenneth C. Griffin

Linvatec

Össur Americas, Inc.

Smith & Nephew Endoscopy

Dr. and Mrs. J. Richard Steadman

Vail Valley Medical Center

\$1,000,000+		
Linvatec Mr. Ephraim Gildor		
\$500,000 - \$999,999		
Smith & Nephew Endoscopy Arthrex, Inc.		
\$100,000 - \$499,999		
Mr. Herbert Allen Mrs. Peggy Fossett Mr. Kenneth Griffin Mr. Jorge Paulo Lemann	Ortho Rehab Össur Americas, Inc. Mr. Steven Read Mr. and Mrs. Gary Rosenbach	Siemens The Liniger Family Foundation Vail Valley Medical Center

\$25,000 - \$99,999

American Academy of Orthopaedic Surgeons
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The James M. Cox, Jr. Foundation
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Small Bone Innovations
Dr. and Mrs. J. R. Steadman
Dr. William I. Sterett
Mr. and Mrs. Richard F. Teerlink
Dr. Randy Viola
Vail Valley Foundation

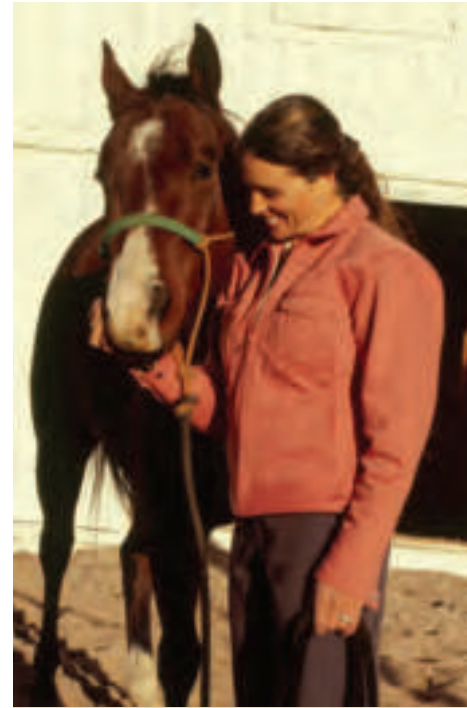
\$10,000 - \$24,999

Mr. Edward C. and Mrs. Dawn Abraham
Mr. and Mrs. Herbert Bank
Helen S. and Merrill L. Bank Foundation, Inc.
Mr. and Mrs. Erik Borgen

Dr. and Mrs. Thomas Clanton, M.D.
Audrey Hillman Fisher Foundation
The Spiritus Gladius Foundation
Mr. and Mrs. Milledge A. Hart
Howard Head Sports Medicine Center
Mr. and Mrs. Warren Hellman
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Ms. Valerie Weber
Mr. and Mrs. Patrick Welsh

\$1,000 - \$9,999

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Dr. and Mrs. Kenneth H. Cooper
Mr. Archibald Cox, Jr.
Mr. Marshall C. and Mrs. Jane R. Crouch
Mr. and Mrs. Andrew P. Daly
General and Mrs. Peter Dawkins
Mr. and Mrs. John W. Dayton



Education and Research Grants

Sharing our research findings throughout the world is a vital part of our educational and research mission. We wish to thank the following sponsors for their support:

European Visiting Scholar, sponsored by Arthrex, Inc.

Brazilian Visiting Scholar, sponsored by Instituto Brazil de Tecnologias da Saúde

Sports Medicine Imaging Research Fellowship, sponsored by Siemens

Bioskills Research and Education Grant, sponsored by Smith & Nephew

Darius Rucker Headlines Summer Benefit Concert, Rock the Research,
Presented by Vail Valley Pharmacy and The Yates and Nisonoff Families



Rock the Research, July 5, 2012, Gerald R. Ford Amphitheater, Vail, Colorado.

Capitol recording artist and country star, Darius Rucker—a former patient of Dr. Richard Steadman—showed his support for the Steadman Philippon Research Institute (SPRI) as he returned July 5th, 2012 to headline the Institute's annual summer fundraising concert for a third year in a row.

This year's event, *Rock the Research*, drew a sold-out standing room only crowd of 2,700 to the Gerald R. Ford Amphitheater in Vail, Colorado, and a post-concert dinner of more than 450 patrons. All proceeds from the evening supported the research and education programs of SPRI most notably in the areas of joint preservation and joint restoration research along with new initiatives in youth sports injury prevention.

SPRI is most grateful to our presenting sponsor Vail Valley Pharmacy and the Yates



Darius Rucker with young SPRI fans.

and Nisonoff Families who provided the necessary financial support to underwrite the concert and celebration, and to Darius Rucker and his management team for providing his incomparable entertainment.

In addition, we wish to express our sincere appreciation to the following sponsors and participants:

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Dr. Steadman presents honorary SPRI lab coat to Darius Rucker.

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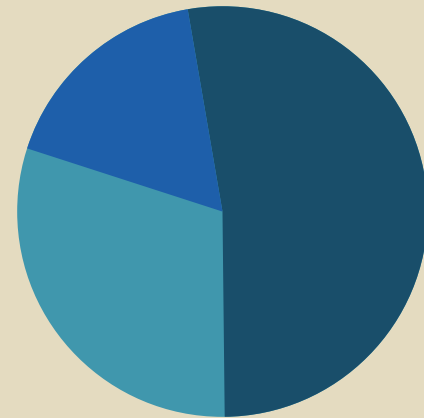
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The Face of Philanthropy in 2011

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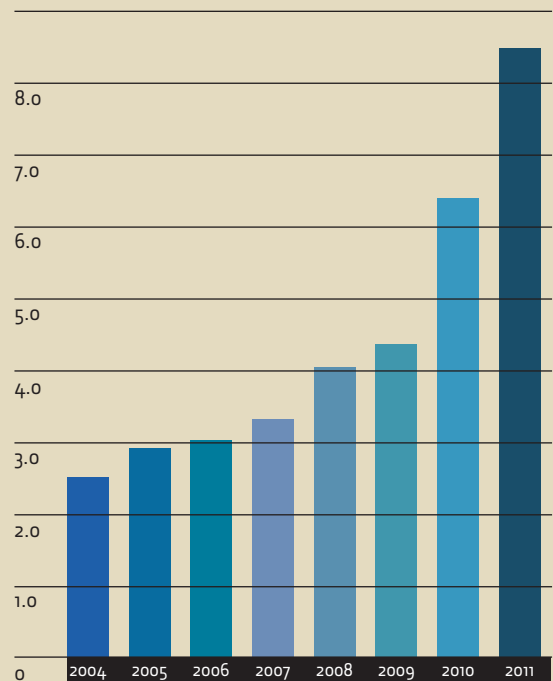
■ MRI and Other Revenue \$1,434,026
 ■ Family and Friends \$2,586,921
 ■ Corporate Support \$4,416,865

Increasing Generosity

In 2011, individuals, corporations, and foundations contributed \$8,437,812.

EIGHT YEARS OF SUPPORT

(\$ Millions)





The Founders' Legacy Society

Over the years, the Institute has been privileged to receive generous and thoughtful gifts from friends and supporters who remembered the Institute in their estate plans. In fact, many of our friends—strong believers and supporters of our work today—want to continue their support after their lifetimes. Through the creation of bequests, charitable trusts, and other creative gifts that benefit both our donors and the Institute, our supporters have become visible partners with us in our mission to keep people physically active through orthopaedic research and education in arthritis, healing, rehabilitation, and injury prevention.

To honor and thank these friends, the Founders' Legacy Society was created to recognize those individuals who have invested not only in our tomorrow, but also in the health and vitality of tomorrow's generations.

Our future in accomplishing great strides, from understanding degenerative joint disease, joint biomechanics, and osteoarthritis to providing education and training programs, is ensured by the vision and forethought of friends and supporters who include us in their estate plans. The Institute's planned giving program was established to help donors explore a variety of ways to remember the Institute. We are most grateful to these individuals for their support in becoming founding members of the Founders' Legacy Society:

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*Vail Valley Medical Center 2011 Steadman
 Philippon Research Institute Golf Classic
 Presented by RE/MAX, LLC*

The Institute was selected by RE/MAX, LLC, the global real estate firm, to again hold the 8th annual Golf Classic at Sanctuary, a premier golf resort located south of Denver.

Proceeds from the tournament support the development of new procedures and methodology to battle degenerative arthritis. The tournament was open to the public and included grateful patients and corporate supporters.

Since 2004, the Institute has raised more than \$1,100,000 from this golf tournament to support its research programs. Renowned course architect Jim Engh, Golf Digest's first-ever "Architect of the Year," designed the course that protects a private oasis of 220 acres, effectively complementing the 40,000 surrounding acres of dedicated open space.

The Institute is grateful to Mr. Dave and Mrs. Gail Liniger, owners and cofounders of RE/MAX, LLC who developed Sanctuary and created this unique opportunity for the Institute to develop and enhance relationships with those who support our mission. In addition, we wish to express our sincere appreciation to the following sponsors and participants:

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The education of orthopaedic surgeons is a critically important mission of the Institute. Academic Chairs provide the continuity of funding necessary to train physicians for the future, thus ensuring the continued advancement of medical research.

Currently, more than 190 Fellows practice around the world. We wish to express our gratitude and appreciation to the following individuals and foundations that have made a five-year \$125,000 commitment to the Fellowship Program to support medical research and education. In 2011, six chairs provided important funding for the Institute's research and educational mission. We are most grateful for the support from the following individuals:

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Medical research and education programs are supported by gifts to the Institute's annual fund. Visionaries are those patients and their families, trustees, staff, corporations, and foundations whose lifetime cumulative giving totals \$10,000 or more.

Donors at this level support many programs, including the Institute's research to validate the success of new treatments for degenerative arthritis and identify factors that influence treatment success. For example, as youth sports injuries rise to epidemic proportions due to early specialization and extensive practicing, the Institute is researching conditions and injuries commonly associated with specific sports, such as hip impingement in young hockey players, to determine how to prevent and treat them.

Injuries in growing children may cause unforeseen complications during adulthood such as an early onset of osteoarthritis.

Visionaries' gifts ensure the advancement of evidenced-based medical research, joint preservation research, science, and care, as well as the education of physicians for the future. We extend our gratitude to these individuals for their lifetime of support:

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THE YEAR IN RESEARCH & EDUCATION

Center for Translational and Regenerative Medicine Research

William G. Rodkey, D.V.M., Diplomat, ACVS, Chief Scientific Officer and Director, Center for Translational and Regenerative Medicine Research

The purpose of our research is to gain a better understanding of factors that lead to: 1) degenerative joint disease; 2) osteoarthritis; 3) improved healing of soft tissues such as ligaments, tendons, articular cartilage, and meniscus cartilage; and 4) novel and untried approaches of treatment modalities. Our focus is to develop new surgical techniques, innovative adjunct therapies, rehabilitative treatments, and related programs that will help to delay, minimize, or prevent the development of degenerative joint disease. In 2011, we collaborated with various educational institutions, predominantly Colorado State University (CSU). We believe that our combined efforts will lead directly to slowing the degenerative processes, as well as finding new ways to enhance healing and regeneration of injured tissues.

The relatively new area of regenerative medicine coupled with biological enhancement of tissue healing is an exciting one that has gained global attention, especially in the areas of orthopaedic sports medicine and in the care of combat casualties from our military services. Many of the applications lend themselves to treatment of posttraumatic osteoarthritis. There are many new and innovative techniques under investigation by scientists around the world, including stem cells, blood products, and synthetic materials which exploit new sciences such as nanotechnology and electrospinning. One of the broad goals of this work can be stated simply as joint preservation. In 2011, we again focused our efforts on regeneration of an improved tissue for resurfacing of articular cartilage (chondral) defects that typically lead to degenerative osteoarthritis. We successfully completed the first phase of the promising area of adult autogenous (one's own) mesenchymal stem cell (MSCs) therapy in collaboration with Drs. Wayne McIlwraith and David Frisbie at CSU. The positive results of that work were published late in 2011 in the journal *Arthroscopy*. The data and encouraging findings support pursuit of regulatory approval to begin human testing. In the laboratory, we have also studied with CSU the effects on cartilage and meniscus healing of platelet-rich plasma (PRP) derived from whole blood. We have looked specifically at how different PRP preparation techniques can influence outcomes. That study was recently completed, and a summary of the interesting findings are reported below.

The following provides important background information on what is driving our research efforts and a brief summary of our most recent findings. This work has yielded



William G. Rodkey, D.V.M.

many interesting observations, and the encouraging results and findings will allow us to continue to focus on this work in the coming years with many new studies planned.

Osteoarthritis (OA) is a debilitating and progressive disease characterized by the deterioration of articular cartilage accompanied by changes in the subchondral bone and soft tissues of the joint. Traumatic injury to joints is also often associated with acute damage to the articular cartilage. Unfortunately, hyaline articular (joint) cartilage is a tissue with very poor healing or regenerative potential on its own. Once damaged, articular cartilage typically does not heal, or it may heal with functionless fibrous scar tissue. Such tissue does not possess the biomechanical and biochemical properties of the original hyaline cartilage; hence, the integrity of the articular surface and normal joint functions are compromised. The result is often OA, and the ultimate outcome may necessitate total joint replacement with metal and plastic. Our goal is to find therapeutic interventions that can reverse or slow the progression of OA in order to delay or possibly preclude the need for joint replacement.

The importance and the global impact of OA must not be underestimated. The U.S. Centers for Disease Control estimates that in the next 25 years, at least 75 million Americans (15 to 25 percent of the population) will have some form of arthritis, including degenerative arthritis secondary to injury to the articular cartilage surfaces of the joints. OA is already the most significant cause of disability in the U.S. and Canada, moving ahead of low back pain and heart disease. By the year 2020, more than 60 million Americans and 6 million Canadians will be affected by some degree of OA of just the knee. OA of other joints, especially the hands, will raise this number significantly. The economic impact is enormous, and

the current political discussions on health care costs certainly highlight the importance of OA. It is estimated that OA alone will consume nearly \$100 billion of direct and indirect costs to the American public in 2012.

In addition to reduced function and increased disability, people with OA have reduced quality of life and increased mortality compared with those without the condition. A 2011 publication has shown that among U.S. adults ages 50 to 84, an average of 1.7 quality-adjusted life-years per person, or a population total of 10 million quality-adjusted life years, are lost to symptomatic knee OA alone annually. This impact increases to a total of 86 million quality-adjusted life-years lost if obesity, knee OA, or their combination, is considered. Therefore, OA imposes a substantial burden of disease at the global, national, and individual levels that is likely to increase with time as the world's populations age and experience ever increasing rates of obesity.

The intangibles of this terrible disease include the chronic pain, disability, and psychological distress on the individual plus the family unit. We believe that our research can have far-reaching effects by greatly enhancing the resurfacing of damaged or arthritic joints before the disease process reaches the advanced and debilitating state. And most

importantly, the patients can remain more active and combat obesity and its devastating effects.

We have previously proven that arthroscopic subchondral bone plate microfracture is a successful method to promote adequate cartilage healing by enhancing both quality and quantity of the repair tissue. The technique relies on the body's own cells and healing factors present in the bone marrow to promote healing, thus avoiding concerns of immune reactions to transplanted tissues or the need for a second surgical site or second surgery to collect grafts or cells. Our clinical experience confirms that microfracture in its current form leads to demonstrable improvement in about 80 to 85 percent of patients over time. While such results are very positive, we are currently searching for ways to achieve even better outcomes.

As previously noted, we have completed the initial study involving the use of adult autogenous (one's own) MSCs, which come from the patients themselves, as an adjunct to microfracture. That is, there is no use of embryonic stem cells, nor is there a necessity to find donors. Each patient is his/her own source of the stem cells. We surmised that when injected into the joint after microfracture, these stem cells would enhance the speed and intensity of the cartilage resurfacing



process. Our goals were to be able to accelerate rehabilitation, decrease postoperative pain, lessen lost time from work or sports, and hopefully reduce overall financial costs.

This study, carried out in an equine model, was published in 2011 in the journal *Arthroscopy*. We compared microfracture alone to microfracture with the addition of 20 million bone marrow-derived MSCs. While we were not able to demonstrate statistically significant clinical improvements or histologic differences between the treated and control groups, it is highly noteworthy that there was statistically significant enhancement in repair tissue firmness and repair quality based on improved aggrecan staining after intra-articular administration of bone marrow-derived culture-expanded MSCs. The lack of differences clinically and histologically likely is explained by the fact that the study duration was only 12 months, a relatively short time for articular cartilage studies, and also by the fact that we have proven that microfracture alone yields very good to excellent results. However, it is the marked improvement in cartilage quality that gives us strong encouragement that this method holds promise for clinical use in human patients.

We are now prepared to elevate our discussions with the FDA about starting a human clinical trial using these techniques. FDA decisions are difficult to predict, but we are hopeful that initial human studies are in the not-too-distant future.



Another study completed in 2011 in collaboration with CSU involved the use of platelet-rich plasma, or PRP, that is made from the patient's own blood. PRP represents an accessible and inexpensive source of growth factors and healing proteins that has received extensive attention in both professional and lay publications. Most of the PRP studies have focused on tissues such as muscles, ligaments, and tendons, but few studies have evaluated PRP effects on articular cartilage and meniscus tissue. An important factor in determining PRP potential to heal joint tissues is the dose of platelets that optimally stimulates the healing and growth of articular cartilage and meniscus. Various studies have described platelet concentrations in PRP ranging from two- to eight-fold compared with circulating blood. PRP containing less than or equal to a two-fold increase in platelet concentration can be produced with a single centrifugation spin technique. To obtain a higher concentration of platelets, a second or third spin with higher forces and speeds is necessary. Since higher platelet concentrations yield higher doses of growth factors and healing proteins, we hypothesized that the higher concentration preparations of PRP would have a greater stimulatory effect on growth and regeneration of the articular cartilage and meniscus tissue without causing any negative effects. The study was carried out in vitro, that is, in a laboratory setting without using any animals.

We found that, somewhat surprisingly, the higher concentration PRP preparations did not stimulate more growth, and in fact, we saw some negative effects at higher concentrations. From this study, we conclude that high platelet concentrations of PRP for intra-articular injection should be viewed cautiously and with reservations. That is, more may not necessarily be better with PRP. Nonetheless, we clearly recognize the limitations of this in vitro laboratory study, and we realize that the living animal or human joint is a different situation. The only way to confirm our findings is with additional studies in an animal model, and then potentially a human clinical trial, dependent on the animal study outcomes. This study manuscript has been accepted and will be published in the journal *Cartilage* in 2012.

These continue to be productive and exciting times that have yielded very useful findings, and we feel that more very important and encouraging research results lie just ahead for the Center for Translational and Regenerative Medicine Research group and the Steadman Philippon Research Institute. We are encouraged to take the next steps toward human clinical trials.

Ed Reed: “Life Is More Important Than the Game I Play”

By Jim Brown, Executive Editor, *SPRI News*

When Baltimore Ravens All-Pro safety Ed Reed walked off the field after a season-ending loss to Pittsburgh in 2009, a reporter asked him if he was going to retire.

“I’m thinking about it,” replied Mr. Reed. His answer sent shockwaves throughout Ravens nation, not to mention the team’s front office. Mr. Reed had quietly become a superstar on a team with lots of big personalities (see Ray Lewis), and was considered one of the most feared defensive backs in the National Football League.

At every level, Mr. Reed’s achievements are Hall of Fame quality. Born in St. Rose, Louisiana, near New Orleans, Reed lettered in four sports at Destrehan High School. He was an All-District pitcher in baseball, a star in basketball, a state champion in the javelin, and an All-State defensive back and kick returner in football. He has been inducted into the Destrehan High School Athletic Hall of Fame.

At the University of Miami, he was a two-time All American, Football News National Defensive Player of Year, and leader of a team that won the national championship in 2001. He was also All Big East in the javelin. A year earlier, he chose not to make himself available for the NFL draft and instead, returned to Miami to earn a degree in liberal arts. Mr. Reed was inducted into the University of Miami Sports Hall of Fame in March 2012.

Mr. Reed was a first round pick of the Baltimore Ravens in the 2002 draft. He was named the NFL’s Defensive Player of the Year in 2004, and had begun what would become a string of eight Pro Bowl appearances.

Troy Polamalu, the rock star safety for Pittsburgh, told the *New York Times*, “We all learn from each other, but we learn the most from Ed Reed.”

Ravens fans sometimes refer to Mr. Reed as “ballhawk” because of his uncanny ability to manufacture turnovers with interceptions, forced fumbles, fumble recoveries, and even steals.

Back to 2009

So now we’re back to 2009, and Ed Reed is thinking about retiring?

“I really wasn’t thinking about quitting,” remembers Mr. Reed. “Emotions were high after that game, and I was worn down. It was more a case of re-assessing my position, physically, mentally, and professionally. Life is more important than the game I play.”

The 2009 season had been difficult for Mr. Reed. “On the first play of the season, I had a slight stinger on my left side. On the next play, I stopped the run and felt it again.

I played the rest of the game, the rest of the regular season, and into the playoffs, and probably made it worse.”

Mr. Reed got a diagnosis of the hip injury after the season, but thought he needed a second opinion. His agent told him about an orthopaedic surgeon named Marc Philippon at the Steadman Clinic and Steadman Philippon Research Institute in Vail.

Mr. Reed didn’t agree to schedule an appointment immediately. As he had done throughout his athletic career, he began to do his homework—this time on one of the world’s foremost hip surgeons. One writer said of Mr. Reed’s meticulous preparation, “He has extraordinary athletic gifts married with a gymnast’s devotion to hours of film study.”

“Once I did the research and talked with my doctor,” says Mr. Reed, “I knew I was making the right decision. Dr. Philippon is a great man, very smart, and very cool to be around. He was clear on what needed to be done, and I felt that he was recommending the best thing for my situation.”

On May 3, 2010, Dr. Philippon performed surgery to repair a torn labrum in Mr. Reed’s left hip. Dr. Philippon is internationally known for performing joint preservation procedures utilizing arthroscopic techniques and for specializing in procedures to repair labral tears. He used techniques in Mr. Reed’s procedure that were developed and refined through years of research conducted at the Steadman Philippon Research Institute.

Mr. Reed spent the next month in Vail at his own expense, staying in contact with Dr. Philippon and the Steadman Clinic staff and doing rehab at Howard Head Sports Medicine.

The Right People

“I went into the experience with confidence, knowing that the people who were going to put their hands on me were the right people. That was something off my shoulders real fast. And they exceeded everything I thought would happen. I listened to them and did exactly what they told me to do. They even worked with my doctor back in Georgia after I returned from Vail. They still stay in touch.”

Mr. Reed feels strongly about the work of the Steadman Clinic, the Steadman Philippon Research Institute, and physical therapists and trainers at Howard Head Sports Medicine. “If there was a league for treating sports injuries above the NFL level in football, Steadman Philippon would be it. They have the most elite group of doctors I’ve ever seen.”

Following his surgery, he returned to play most of the 2010 season and all of the 2011



Baltimore Ravens free safety Ed Reed leaves New York Jets defensive back Isaiah Trufant on the ground as he carries the ball during the second half of an NFL football game in Baltimore, Sunday, Oct. 2, 2011. (AP Photo/Gail Burton)

season. After the last game, he got the same question that had been asked in 2009, but from a different person.

“Are you going to retire?” asked Ravens’ head coach John Harbaugh.

“I have one more year in me,” answered Mr. Reed.

Watch for him when the 2012 NFL season opens in September. He’s number 20 and he’ll be the Ravens’ safety for the 11th consecutive year. He’s something to see.

Life After Football

Ed Reed was raised in south Louisiana, spent four years in Florida, plays football in Maryland, and lives in Georgia during the off-season. In Louisiana, the major topics of conversation when you go out to eat are:

- 1) restaurant meals that you have had in the past, and
- 2) restaurant meals that you plan to have in the future.

“Of all the places he has visited or lived, which has the best food?” we asked.

“South Louisiana, all day long,” Mr. Reed responded, laughing and not hesitating.

Mr. Reed has taken his interest in a healthy lifestyle and Louisiana food—two terms that have never been used in the same sentence—to the consumer food market. He has teamed with Roma Gourmet Sausage of Baltimore (<http://www.romagourmet.com>) to produce Ed Reed’s Chicken Sausage. It has 50 percent less sodium and 20 percent less fat, and comes in four varieties.

In addition to his business interests, Mr. Reed has established the “Eye of the Hurricane” Foundation (<http://www.Edreedfoundation.org>). It is a nonprofit charity focused on helping, improving, and expanding the lives of young people. The foundation conducts charity events and football camps, and provides scholarships, Christmas gifts, school supplies, and athletic equipment for children of lesser means.

“We want to share the life experiences I’ve had and point these children in the right direction,” says Mr. Reed.

The Center for Outcomes-Based Orthopaedic Research

Karen K. Briggs, M.B.A., M.P.H., Director, Center for Outcomes-Based Orthopaedic Research; Marilee P. Horan, M.P.H., Upper Extremity Research Coordinator; Lauren M. Matheny, B.A., Lower Extremity Research Coordinator; Research Interns: Mackenzie Herzog, B.A., Alexandra France, B.S., Morgan Currie, B.S., and Evan Carstensen, B.S.

In 2011, the Center for Outcomes-Based Orthopaedic Research (COOR) (formerly the Department of Clinical Research) completed the process of digitizing the collection of patient data, updating the database software, and developing the patient console. Many of the staff put in countless hours on this project. In addition to a better collection and storage system, this system is providing better quality data and requiring less time on data collection, leaving more time available for research.

Our database continues to grow, with over 13,000 knee surgeries, over 3,200 hip surgeries, over 2,200 shoulder surgeries, and over 800 foot and ankle surgeries. From this database, research projects are created. The following are examples of projects from the past year.

The Arthroscopy Association of North America honored Dr. J. Richard Steadman and the Center with the Richard O'Connor Research Award for the best arthroscopy paper, "Outcomes and Survivorship at 10 years following Arthroscopic Treatment Package for Osteoarthritis of the Knee" (see below). Dr. Steadman developed this arthroscopic treatment package for patients who have osteoarthritis but are not ready to change their activity level or proceed to total knee replacement. This paper showed that a large number of patients could delay total knee replacement for 10 years. Co-authors are Karen Briggs, Lauren Matheny, and Dr. Henry Ellis. Dr. Steadman's presentation and many others were highlighted at the Arthroscopy Association of North America's 31st Annual Meeting in Orlando, Florida, May 17-18.

TEN YEAR SURVIVORSHIP FOLLOWING KNEE ARTHROSCOPY IN PATIENTS WITH MODERATE TO SEVERE OSTEOARTHRITIS OF THE KNEE

Although thousands of people are diagnosed with knee osteoarthritis (OA) each year, there are few options that offer long-term symptomatic relief. Anti-inflammatory drugs and knee injections offer pain relief. However, this reduction in pain is usually short-lived, lasting approximately six months. Other options may include arthroscopy or total knee replacement (TKR). Recent guidelines published by the American Academy of Orthopaedic Surgeons regarding knee arthroscopy for the treatment of knee OA reinforce the controversy of this topic, especially in the face of symptomatic meniscus tears or loose bodies. Some previous studies have recently cast doubt on the value of knee arthroscopy in the face of

end stage OA, but it is unclear if these other studies would have the same results with patient selection criteria based on patients likely to benefit from arthroscopy. And although TKR has shown satisfactory results, many patients do not want to compromise activity level for a reduction in pain, leaving arthroscopy to be a topic for more research.

Although it is difficult to compare published studies due to differences in patient populations, procedures, and rehabilitation protocols, several studies have reported short-term and medium-term benefits from knee arthroscopy in patients with OA. Patients with mechanical symptoms or lower grade OA have been reported to respond well to knee arthroscopy. A previous study reported an 82 percent reduction in pain at two years after a knee arthroscopy for a chondral lesion with the most severe OA grade and a medial meniscus tear. Several other studies have shown other predictors of improved outcome. Factors related to favorable outcomes include less malalignment, younger age, no tibial osteophytes, and limited joint space narrowing. Although successful treatments have been published, the variability in treatment groups and lack of long-term data make it difficult to educate patients on the risks and possible outcomes of this procedure. Regardless of symptoms, active patients younger than 60 years with end stage arthritis are frequently looking for treatment options for their symptomatic OA, even if only a temporizing measure.

After exhausting conservative or non-surgical treatments, a TKR is a predictable and reasonable surgical treatment for end stage OA. However, this option may not be ideal for younger, active patients. Only 20 percent of patients return to higher impact sports (like tennis) after TKR. Following a TKR, most patients return to an activity level equivalent to biking regularly. In fact, a survey from the Knee Society recommended against high impact activity such as racquetball, squash, climbing, soccer, tennis, volleyball, basketball, and jogging after a TKR. Low impact activities, not moderate or high impact activities, are strongly recommended after a TKR.

Although much literature regarding this topic exists, there are limited data documenting long-term results following a knee arthroscopy. Moreover, a majority of the previous studies have not emphasized a specific approach or treatment protocol for knees with advanced OA, or the importance of postoperative rehabilitation. The purpose of this study was to evaluate the long-term outcomes of native knees with end stage OA treated with our comprehensive knee arthroscopic package. We hypothesized that most patients with end stage OA will likely convert to a TKR within 10 years.

METHODS

This study was institutional review board–approved. From August 2000 to November 2001, 81 knees in 73 patients (49 males and 32 females) who underwent knee arthroscopy for symptomatic and advanced OA were identified from 865 knee arthroscopies. Early outcomes have previously been reported on these patients.

Patients were included in the study if they failed conservative or non-surgical treatment for OA and demonstrated severe knee arthritis in at least two of three compartments on x-rays. Non-surgical treatments included activity modification, physical therapy, anti-inflammatory medication, weight reduction, bracing, viscosupplementation/corticosteroid injections, and oral glucosamine. All patients were required to have symptoms associated with OA of the knee, and not limited to only mechanical symptoms. The majority of patients were referred to our clinic for arthroscopic consideration due to their age and activity level, and were otherwise thought to be candidates for a TKR. Patients with coronal malalignment were not candidates for realignment osteotomies. Exclusion criteria included knees with traumatic chondral lesions, mild OA (Kellgren-Lawrence [K-L] grade 0–2), or incomplete radiographic studies.

Standard knee radiographic (x-ray) studies included several views with the patient's knee in extension, flexion, lateral or side views, patellar views, and a long-standing view to assess overall alignment from hip to ankle. Grade of OA was determined by K-L grade, ranging from grade 0, which is no OA, to grade 4, which is the most severe grade of OA. Radiographic inclusion criteria were K-L grade 3 or 4 changes, with multiple osteophytes, definite joint space narrowing, sclerosis, and deformity of bone ends. Malalignment was measured as a percent deviation from neutral position (the center of the knee) when standing. The weight bearing line (WBL) was established by drawing a vertical line from the center of the hip bone to the center of the ankle bone. If this line intersected the exact middle of the knee joint, the WBL was said to be neutral. Deviation in either direction that increased medial or lateral compartment loading was measured on a 0% (neutral) to 100% scale in either direction leading to varus (bow-legged) and valgus (knock-knee) knee malalignment and producing a percentage of shift in the



Left to Right Front: Lauren Matheny, Karen K. Briggs, M.B.A., and Marilee Horan, M.P.H. Left to Right Back: Ashley Darrough, MacKenzie Herzog, and Doug Gillard

WBL from neutral. All patients underwent arthroscopic treatment, which has been previously described.

A strict postoperative rehabilitation program is vital to the success of this procedure. Maintenance of joint volume and prevention of scar formation is the overall goal of postoperative rehabilitation. Maintaining strength is a secondary goal. For these patients, a three-phase program was initiated. The first phase focused on passive and active-assisted range of motion, patellar mobility, and stretching. Patients were instructed to limit weight-bearing for 1–2 weeks after surgery. A continuous passive motion machine was used for the first postoperative week. After six weeks, patients began to work on functional strength training including treadmill walking and biking. At four months, weight training exercises and a return to full activity were allowed.

At 10 years of follow-up, patients were contacted by phone, email, or mail to determine if they had undergone a TKR on the knee that was previously arthroscoped. If patients had not undergone TKR, they were mailed or emailed a subjective questionnaire. The questionnaire documented symptoms, function, activity level, and satisfaction with outcome. Patient satisfaction was graded on a 10-point scale (1=dissatisfied; 10=satisfied).

RESULTS

Of the 81 knees, 7 were deceased and 2 refused to participate, leaving 72 available for follow-up. Follow-up was obtained on 95% of patients (n=69). Average age was 57

years (range: 37 to 78). WBLs of 51 patients fell within the medial compartment, at an average WBL of 41% deviation from neutral (the center of the knee) [95% confidence interval (CI): 30 to 52], and 21 fell within the lateral compartment at an average WBL of 36% [95% CI: 24 to 47]. The medial compartment patients had an average medial joint space of 2.6 mm [95% CI: 1.9 to 3.2], and the lateral compartment patients had an average lateral joint space of 4.5 mm [95% CI: 3.5 to 5.5]. Mean volume of the knee was 160 ml [95% CI: 140 to 180].

Repeat arthroscopy was performed in 15 knees (21%) due to recurrent mechanical symptoms. Six of these patients went on to subsequent TKR. Of the 69 knees, 43 knees (62%) were converted to TKR at an average of 4.4 years (range: 1.0 to 9.6 years) following index knee arthroscopy. Patients who were converted to TKR were older (59.8 years) compared with those who did not undergo TKR (52.8 years) ($p=0.013$). There were 13 females and 30 males ($p=0.083$). Patients who underwent a TKR were more likely to be grade 4 K-L at arthroscopy (24) compared with grade 3 K-L (19) ($p=0.015$). More patients with “kissing” lesions, or lesions both on the touching parts of the femur and tibia, failed (36) compared with those without (7) ($p=0.003$). There was no difference based on which compartment the patients’ WBL fell within (26 medial and 8 lateral) ($p=0.547$).

Survivorship was defined as not having undergone TKR at final follow-up. Survivorship, or patients who did not fail and undergo a TKR, was 60% at 5 years, 47% at 7 years, and

40% at 10 years. Patients who failed arthroscopic treatment and underwent a total knee arthroplasty did not show a correlation with gender or malalignment. Age was associated with failure or TKR. Failures were significantly older by 8.8 years compared with those who did not undergo a TKR (mean difference=8.8 years [95% CI: 2.7 to 14.9]) ($p=0.005$). Patients who had a grade 4 K-L had a significantly lower time to TKR (average time to TKR=5.9 years [95% CI: 4.6 to 7.1]) compared with patients with grade 3 K-L (average time to TKR=7.5 years [95% CI: 6.2 to 8.7]) ($p=0.032$).

After 10 years following arthroscopy, 26 knees had not undergone TKR. There were no significant differences between males and females regarding function, activity level, or patient satisfaction scores ($p>0.05$). Age did not correlate with functional scores, activity level, or patient satisfaction with outcome ($p>0.05$).

DISCUSSION

Arthroscopic treatment of the knee in patients with OA has been used to relieve symptoms and delay replacement. This study showed that a high percentage of patients were able to delay knee replacement for five years, but by 10 years, 60 percent of patients had undergone TKR. However, avoiding a TKR for five to ten years is desirable in order to retain a significant activity level without compromising the longevity of the TKR. In our study, younger patients and patients with moderate OA at time of arthroscopy were more likely to delay replacement for a longer period of time when compared to older patients or patients with severe OA.



SPORT.DR Data Collection Software is a Game-Changer for SPRI's Center for Outcomes-Based Orthopaedic Research

By Jim Brown, Executive Editor, *SPRI News*

In order for the benefits of arthroscopy to be maintained, we believe that the improved joint space and motion of the knee must be maintained with rehabilitation focused on maintenance of the joint mobility gained in surgery. Increasing joint volume was emphasized in our treatment protocol. Studies have shown that volume loss may alter joint mechanics with increased patellofemoral and tibiofemoral joint reaction force. These changes often lead to anterior knee pain, which is why we believe joint space to play an important role in the recovery process.

Our arthroscopic goal was to establish a healthy environment to prolong the life of the native knee. In our study, patients underwent a very strict postoperative rehabilitation program in order to maximize success of arthroscopy. Our patients focused on both patellofemoral and tibiofemoral range of motion during the early postoperative weeks to avoid recurrence of scarring or adhesions. Previous studies have reported similar findings, documenting improved outcomes and lower complication rates.

Patients in this study had a desire to avoid TKR, not only to retain their activity level, but to also avoid a revision TKR surgery due to early deterioration of the TKR implant. Patients were also thoroughly counseled that this procedure was not a cure for arthritis, but a temporizing treatment. Although there is controversy surrounding arthroscopy in older patients with moderate to severe OA, this patient population benefited with arthroscopic intervention by delaying TKR while maintaining a suitable activity level. Patients in this study were able to maintain an activity level which allowed them to participate in recreational sports on average. The value in maintaining activity level has been well documented. As limitations are placed on physical activity, quality of life has been shown to decrease over time. Various studies have shown that physical activity correlates with general health increases.

Over the past months, the Center for Outcomes-Based Orthopaedic Research at SPRI has quietly converted from a paper and scanning-based method of collecting data to one that uses paperless, tablet technology and software. The new software is called SPORT.DR, which stands for Steadman Philippon Outcomes Research Data Registry. It was implemented with the help of Littleton, Colorado-based Clinical Trial Site Solutions (CTSS).

The results, according to the Center's director Karen Briggs, have been quick and dramatic. "The new software has been a game-changer for those of us in Orthopaedic Research. Our data capture costs have been reduced by more than 97 percent, our quality is better, and we have information available much quicker."

The old system required patients, physicians, and SPRI's research scientists to fill out paper forms, having a person process the forms using a scanner, and utilizing another person to independently verify that data for mistakes or omissions—all before actual research was begun.

Instantaneous Data Capture

"The SPORT.DR software allows SPRI doctors to complete a form on a computer tablet device after a clinical examination of a patient," explains Briggs. "Our software sends a PDF to the patient as a backup to their medical record. We get all of the data instantaneously."

On the patient side of the process, a person can fill out a form online before ever arriving at SPRI, or they can use an iPad in the waiting room once they've arrived. Either way, time is saved. "One person coordinates all data questions," adds Briggs. "Instead of scanning forms all day, our interns can do research all day, and we can start research on a patient the minute he or she is done."

One of the features of SPRI's massive database is that records have been kept on some patients for as long as 20 years. "We've been keeping in touch with them by regular U.S. mail, sending follow-up



questionnaires at least once a year. Now we can do it by email and not send out a thousand pieces of mail a month."

Time and Money Saved

"The whole process represents a major saving in terms of time and money," says Briggs. "We don't have paper forms anymore, we don't have to pay for mailing, and we don't have to manually verify data. The forms double-check themselves. Patients have to respond in certain ways. If they don't, the program prompts them to correctly enter data. When the data collection is complete, it immediately goes into the database and into what we call our Patient Report Card."

The SPRI staff compared the cost of the old system with the SPORT.DR system and found a 97.33 percent reduction in cost—\$3.75 per patient encounter record then; \$0.10 per patient record now.

Briggs says that all of the existing data in SPRI's database has been merged into the new system. "Implementation of the new system is about 98 percent complete, but it seems like we think of a new feature to add every day."

In terms of productivity, the results of SPORT.DR have been impressive. "We've already submitted five times more abstracts for publication or presentation at professional meetings than we ever have before during a similar time period, and it's because the SPORT.DR software gives us more time to do research."

CONCLUSIONS

In conclusion, select patients who underwent arthroscopy for the treatment of OA of the knee were able to delay TKR for five to ten years. This study demonstrated that approximately 40 percent of patients who were originally candidates for TKR were able to delay replacement for 10 years. Patient age and degree of OA were shown to play a role in progression to knee replacement. This study won the prestigious Richard O'Connor award at the Arthroscopy Association of North America for 2012.

DOES KELLGREN-LAWRENCE GRADE CORRELATE WITH ARTHROSCOPIC FINDINGS IN KNEE?

Osteoarthritis (OA) is one of the most prevalent chronic diseases in the U.S. and represents an enormous socioeconomic burden to American society. As the grade of knee OA increases, degree of disability also increases, therefore it is important to accurately determine degree of OA. Several radiographic grading scales for OA of the knee have been developed. The Kellgren-Lawrence (K-L) grading system has long been used for radiographic diagnosis of OA. Many physicians rely on this grading system in order to define the presence of and make an estimation of the degree of OA and then determine the most appropriate treatment for each patient. We wanted to see what type of arthroscopic findings from knee surgery may be associated with each K-L grade, 0 to 4.

Dr. Steadman examined 865 patients who had a long-standing radiograph, which is an x-ray taken in an upright standing position with the knees in full extension, producing a full view of the legs from hip to ankle. These radiographs were then assessed using the K-L grading system. The five K-L grades are defined as: (0) no radiographic findings of OA, or no OA, (1) little to no joint space narrowing present, minute osteophytes (bone spurs), or mild OA, (2) some joint space narrowing and presence of osteophytes, or mild/intermediate OA, (3) greater presence of osteophytes, notable joint space narrowing, and possible deformation of the femur or tibia, or moderate OA, and (4) large osteophytes, near closure of the joint space, and large deformations of the femur or tibia, or severe OA. All patients underwent knee arthroscopy within 30 days of their clinical exam. Patients under the age of 18 years were excluded. K-L grade determined upon radiographic examination was recorded. Patients then underwent arthroscopic surgery and the findings during surgery were recorded. K-L grade and arthroscopic findings were then compared and analyzed.

Of the 865 patients, 369 had a K-L grade 0, 147 had a K-L grade 1, 167 had a K-L grade 2, 103 had a K-L grade 3, and 79 had a K-L grade 4. The average age of patients with a K-L grade 0 was 36 years [95% confidence interval (CI):

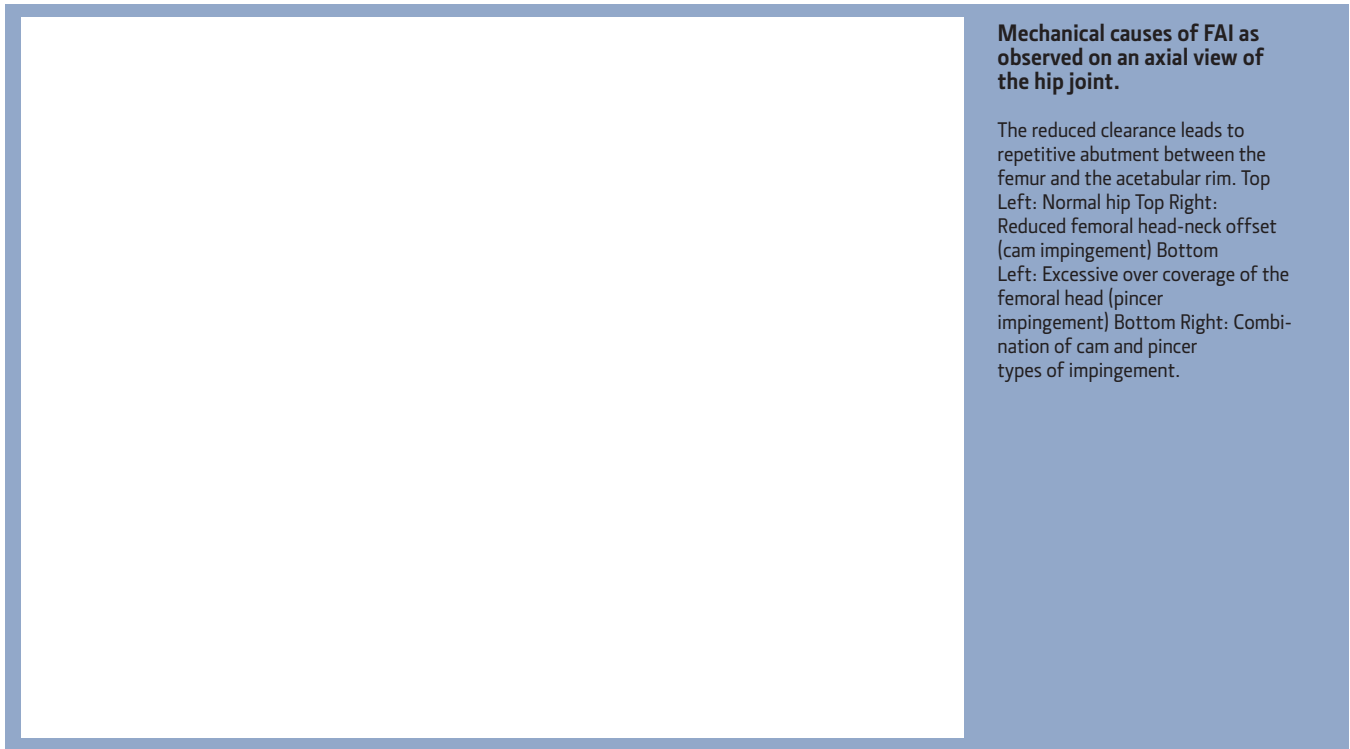
34 to 38], K-L grade 1 was 45 years [95% CI: 43 to 48], K-L grade 2 was 52 years [95% CI: 49 to 54], K-L grade 3 was 57 years [95% CI: 55 to 59], and K-L grade 4 was 59 years [95% CI: 56 to 62] ($p=0.0001$). When documenting findings during arthroscopy, degenerative changes of the knee cartilage were noted in 76% of patients with a K-L grade 4, 69% of patients with a K-L grade 3, 42% of patients with a K-L grade 2, 25% of patients with a K-L grade 1, and 10% of patients with a K-L grade 0 ($p=0.0001$). Degenerative medial meniscus changes were observed in 42% of patients with a K-L grade 4, 38% of patients with a K-L grade 3, 23% of patients with a K-L grade 2, 13% of patients with a K-L grade 1, and 6% of patients with a K-L grade 0 ($p=0.0001$). Degenerative lateral meniscus changes were observed in 48% of patients with a K-L grade 4, 40% of patients with a K-L grade 3, 32% of patients with a K-L grade 2, 19% of patients with a K-L grade 1, and 8% of patients with a K-L grade 0 ($p=0.0001$). Osteophytes were observed in 68% of patients with a K-L grade 4, 50% of patients with a K-L grade 3, 31% of patients with a K-L grade 2, 9% of patients with a K-L grade 1, and 2% of patients with a K-L grade 0 ($p=0.0001$).

Overall, this study confirmed that arthroscopic findings commonly associated with degenerative changes in the knee are detected radiographically most often in patients with K-L grades 3 and 4. These arthroscopic findings that were commonly found in patients with a K-L grade 3 or 4, which demonstrates moderate to severe OA, were rarely detected in patients with a K-L grade 0 or 1. These results suggest that the K-L grading scale does correlate with findings observed during arthroscopy. This information is helpful to physicians, demonstrating that the K-L grading scale is a reliable scale that can accurately assess OA radiographically, allowing the most appropriate treatment for each patient to be determined. Through accurate assessment and treatment of knee OA, patient care and satisfaction may be improved.

HIP RESEARCH

Return to Play Following Labral Reconstruction of the Hip in Elite Athletes

Femoracetabular impingement (FAI) is an increasingly well-recognized cause of hip pain and, as a result, damage to the acetabular labrum. The acetabular labrum is a ring of cartilage-like tissue that is attached to the outer edge of the hip socket. Biomechanical testing has made it increasingly clear that this piece of tissue is essential for normal hip function, stability, and the life of the joint's cartilage. Tears of the labrum in the hip are often associated with a traumatic injury, such as a dislocation in sports or a motor vehicle accident, or as we now know, with the movements of the normal range of motion in hips with abnormal bony shape, such as in the cam and pincer lesions of FAI. The cam lesion is a bony overgrowth on the top of the hip bone and the pincer is



Mechanical causes of FAI as observed on an axial view of the hip joint.

The reduced clearance leads to repetitive abutment between the femur and the acetabular rim. Top Left: Normal hip Top Right: Reduced femoral head-neck offset (cam impingement) Bottom Left: Excessive over coverage of the femoral head (pincer impingement) Bottom Right: Combination of cam and pincer types of impingement.

extra bone on the pelvis; they frequently exist simultaneously in the same hip. Both lead to excessive rubbing and tearing of the labrum and cartilage during movement, and especially during the repetitive movements that elite must perform to reach the high levels of expertise of their sport. Athletes, therefore, have even higher requirements of their hip joints and truly need the labrum to be intact. Additionally, tears to this tissue can lead to earlier development of osteoarthritis, particularly in the athlete.

Most basic tears of the labrum can be repaired by anchoring it back to the rim of the hip socket. However, the patient with an irreparable labrum, one that is too small or degenerated from repetitive friction or trauma, presents a difficult clinical problem. Athletes with significant pain often present in this situation with severe labral damage. For these patients, we have pioneered a new technique to reconstruct the labrum from a piece of tissue taken from the patient's own leg. We have had good results so far in a less active patient population, but the purpose of this study was to evaluate the success of this reconstruction procedure in a group of 21 high level and professional athletes. We collected both outcomes scores and the quality of their play via pre and postoperative statistics, if they returned to fully evaluate.

Out of this group, 11 had had previous surgery on the same hip for their symptoms. After their reconstruction procedure, two of the older athletes eventually went on to total hip replacements due to arthritis. All of the outcomes

scores measured improved, particularly the modified Harris Hip Score and the Hip Outcome Score, Sports Activity Subsection. These increased by 17 and 21 points, respectively. Two patients had to undergo a second arthroscopy because they developed painful adhesions, but there were no other surgical complications. Of all the 21 patients, 18 returned to professional sports, and 17 of these successfully returned to the same elite level of play. One other patient returned to the practice field with his professional team, but did not participate in games. Five of the seven professional soccer players, three of the four American football players, and all of the five ice hockey players returned to a similar level of play following surgery. Additionally, the majority of these patients expressed considerable personal satisfaction with the procedure and their ability to participate in their sport.

Thus, the arthroscopic labral reconstruction procedure has had good results in both a regular and an elite athlete patient population. For athletes experiencing limitations from their hip symptoms, arthroscopic labral reconstruction can provide a new option that allows them to continue their careers, and not to retire and undergo a hip replacement.

THREE TO FIVE-YEAR OUTCOMES FOLLOWING LABRAL RECONSTRUCTION

The previous study documented whether elite athletes could return to sport following labral reconstruction. The purpose of this study was to provide information on all

Brandt Snedeker: From Hip Surgery to the Top of Professional Golf in Less Than a Year

By Jim Brown, Executive Editor, *SPRI News*

How many career changing events can you have in one year? Four and counting, if you are professional golf star Brandt Snedeker. Mr. Snedeker had hip surgery at the Steadman Clinic in November of 2011; won a PGA tournament 90 days later at Torrey Pines; was named to the U.S. Ryder Cup team early in September; and won the Tour Championship and the FedExCup on September 23rd in Atlanta.

Other than that, the past year or so has been business as usual for Mr. Snedeker, who joined the PGA after graduating from Vanderbilt and playing two years on the Nationwide Tour. In 2007, he was named PGA Rookie of the Year.

Surgery

Actually, there have been two surgeries, one on the left hip in 2010 and a similar procedure on the right hip last November. "In 2010, my left hip started to hurt during the U.S. Open," recalls Mr. Snedeker. "I thought it might have been just a fluke thing and tried to get through the rest of the season, but it really never got better. I had a sharp stabbing pain when I walked, and it was very sore at night and early every morning."

"I had heard about Dr. Marc Philippon from other golfers and knew that he had treated Greg Norman for a hip problem. Every golfer I talked with had nothing but good things to say about their experience with Dr. Philippon and his colleagues at the Steadman Clinic and the Steadman Philippon Research Institute."

"I sat down with Dr. Philippon on a Monday, and after looking at MRI results, he told me that he could get me back to 100 percent in eight weeks—playing tournaments in 12 weeks. He was completely confident that it was an issue that could be resolved, and he was right. I had the operation two days later, and was playing golf right on schedule."

The hip disorders causing Mr. Snedeker's pain were, among other things, a torn labrum and a condition called femoroacetabular impingement (FAI). FAI is a common cause of hip pain and osteoarthritis that involves too much friction in the hip joint during extreme range of motion movements. "As my left hip got better," says Mr. Snedeker, "I noticed a growing problem in my right hip. It wasn't as bad as the left hip, but it

was causing pain, and nothing I tried could calm it down. I knew I had the same bone problem as in my right hip and that it wasn't going to get any better, so I went back to Vail for pretty much the same procedure done in 2010."

A Win at Torrey Pines

The second surgery was on November 1, 2011. After three weeks of physical therapy in Vail with therapists at Howard Head Sports Medicine, Mr. Snedeker returned to Nashville and continued rehabbing with his physical therapists there.

"Having the surgery was the best health-related decision I've ever made," he says. "Just the knowledge Dr. Philippon has about what he does and working with the physical therapists four to six hours a day was a huge bonus in getting me back to 100 percent."

By mid-January, Mr. Snedeker was back on the course and ready for the PGA tour again. In only his second tournament after surgery, the Farmers Insurance Open at Torrey Pines, he came from seven shots back in the final round and defeated Kyle Stanley in a playoff. It was Mr. Snedeker's third PGA title, but not his last.

Ryder Cup

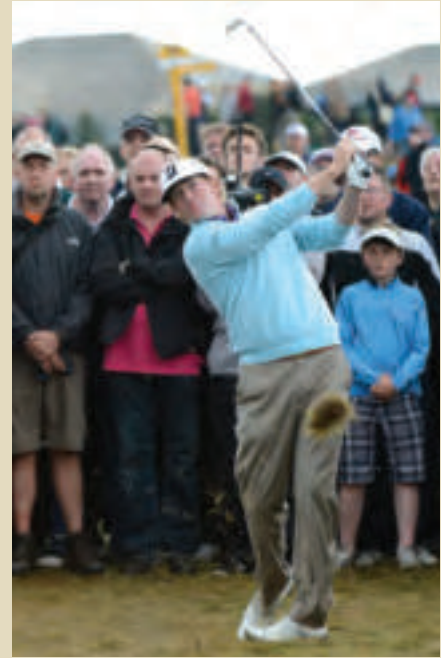
On September 4, 2012, the Ryder Cup team was announced and Mr. Snedeker was one of four wildcard selections made by team captain Davis Love, III.

"He called and asked me if I wanted to represent the United States on the Ryder Cup team," says Mr. Snedeker. "I couldn't say 'yes' fast enough. It's a huge thing for my career."

Mr. Snedeker is also one of four Ryder Cup rookies named to the team. Love wanted "hot" putters on the team, and Mr. Snedeker has been one of the best putters on the tour. The Ryder Cup was played in late September at Medinah Country Club near Chicago, a club that has hosted two PGA Championships since 1999.

Tour Championship and FedExCup

Mr. Snedeker already had the year of a lifetime when the Tour Championship tournament began. In addition to the Farmers Insurance Open, he recorded six top ten finishes and more than \$3.5 million in season earnings.



141st Open Championship, July 20, 2012, at Royal Lytham & St Annes golf course, Lancashire, England. Round 2 - Brandt Snedeker shoots 64 to tie the Lowest round at the course and -10 under par total after 36 holes. © AP Images
Photo: Stuart Robinson, AP Images

By winning the Tour Championship, he added \$1.44 million in prize money, plus a \$10 million bonus from FedEx for accumulating the most points during the season.

"This is what you work your whole life for; all those balls you hit," Mr. Snedeker told the press after the tournament.

Looking Back, Looking Forward

What would Mr. Snedeker tell someone with a hip problem similar to his? "I've heard too many horror stories of what happened to people who didn't take this kind of condition seriously. It can affect you for the rest of your life. It's worth the effort to get the best medical advice, and there is no question that Dr. Philippon and the people at Steadman Philippon are the best at what they do."

To those who might consider supporting SPRI, Mr. Snedeker says, "Every dollar you donate will go toward helping people recover from orthopaedic conditions and injuries. And everything they are doing at SPRI is on the forefront of helping people return to good health as fast as possible. They did it twice for me."

patients who underwent this procedure at greater than three years following their surgery.

From February 2005 to December 2008, 77 patients required acetabular labral reconstruction and were included in this study. The institutional review board approved this study. The patients own iliotibial band was used as the graft. The tubularized graft was passed through an arthroscopic port and secured to the acetabular rim with a series of suture anchors.

Eighteen hips progressed to total hip arthroplasty, and one hip underwent resurfacing. The average time from reconstruction to arthroplasty was 28 months. Of the 57 patients who did not require arthroplasty, the mean time to follow-up was 48 months (range: 36 to 70 months). The median patient satisfaction with outcome was 8.0 out of 10. Patient functional scores, activities of daily living scores, and sport scores all showed significant improvement at follow-up. This study demonstrates that patients undergoing acetabular labral reconstruction did not need a total hip replacement within 56.2 months, on average, following reconstruction. The patients who did not progress to an arthroplasty procedure demonstrated significant improvement in outcome scores and reported high patient satisfaction.

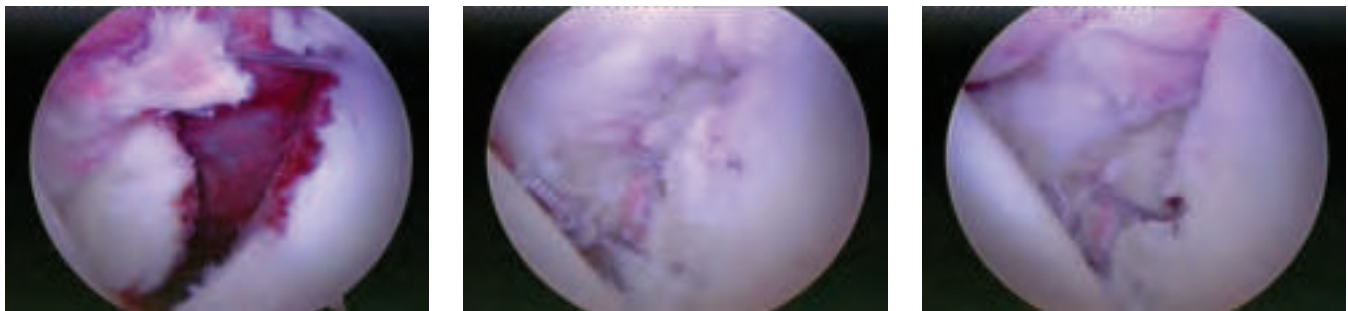
SHOULDER RESEARCH

Anterior Instability Caused by a Fracture of the Glenoid Rim Repaired with a “Bony Bankart Bridge” Technique

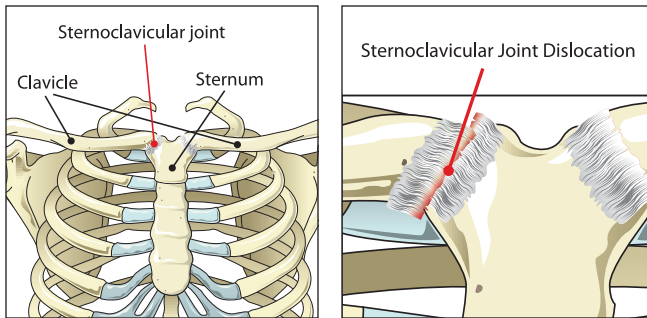
Shoulder instability is a common orthopaedic problem, especially in the younger patient. The condition of instability occurs when the shoulder structures (muscles, tendons, bones, and ligaments) that surround the shoulder do not work in concert to hold the humeral head in the shoulder socket. When a person suffers a direct blow to the shoulder or trauma from a fall or an accident, shoulder instability can result. When the soft tissue in the front of the shoul-

der sustains enough trauma to tear away from the bone, it is called a Bankart lesion. However, when the shoulder trauma is of sufficient force to drive the humeral head into the glenoid, causing a fracture of the glenoid rim, it is called a bony Bankart lesion. In 2007, Porcellini and co-authors published an article in a sports medicine journal stating that there is a 4 to 70 percent incidence of bony Bankart lesions, which mostly occur in men. These bony lesions contribute to recurrent instability after failed soft tissue repair. If these bony Bankart lesions are not fixed at the time of soft tissue repair, recurrent instability can occur. Several different open and arthroscopic techniques for repair or reconstruction of the anterior glenoid rim have been described, with arthroscopic treatment being more challenging.

Dr. Peter Millett and his research scholar from Germany, Dr. Frank Martetschläger (see page 46), identified 19 patients with bony Bankart lesions arthroscopically repaired by Dr. Millett using the arthroscopic Bony Bankart Bridge (BBB) technique. The goal of the study was to evaluate the clinical and functional outcome of the treated patients who were at least one year out from their surgery. There were 16 men and 3 women with an average age of 41 years (range: 19 to 70 years) included in the study. The mean duration of follow-up was 2.5 years (range: 1 to 4 years). The majority of patients had a ski or snowboarding fall (15/19) and noted several dislocations prior to surgical repair. Only one patient had had a prior soft tissue repair for problems with instability. At an average of 2.5 years postoperatively, the American Shoulder and Elbow Surgeons (ASES) score and Single Assessment Numeric Evaluation (SANE) score were excellent, with 97.6 and 97.4, respectively, out of 100 points. Patient satisfaction was 9.1 out of 10. Two patients reported a re-injury that has caused recurrent feeling of shoulder instability. In conclusion, the BBB arthroscopic technique restores shoulder stability and provides good shoulder function as well as patient satisfaction for these difficult-to-treat cases.



(a) Diagnostic arthroscopy confirms the presence of an anteroinferior bony Bankart lesion. Note the bony fragment is still attached to the anterior capsule. (b) A medial anchor is secured and its sutures are passed around the bony fragment and capsule. The free ends are secured to another anchor which is placed in a lateral position, reducing the fragment together with the soft tissue. (c) Completed BBB repair after insertion of the lateral anchor.



Sternoclavids

Illustration: Marty Bee

TENDON GRAFT RECONSTRUCTION FOR ANTERIOR STERNOCLAVICULAR (SC) JOINT INSTABILITY

Sternoclavicular (SC) joint instability is very rare and comprises only three percent of all shoulder injuries. This type of joint injury mainly occurs after high-energy trauma caused by motor vehicle crashes or sports injuries. The treatment of injuries that affect the sternal articulation of the shoulder girdle is controversial. For SC joint instability, the first line of treatment is usually non-operative. However, if patients complain of ongoing pain and a feeling of SC instability after initial immobilization and physical therapy, surgical treatment is recommended. Numerous doctors have described several operative procedures for these injuries, with varying results. The goal of this study by Dr. Peter Millett and Dr. Frank Martetschläger was to evaluate the clinical and functional outcome of 15 patients who were surgically treated for SC joint instability by tendon graft reconstruction. Indications for surgical reconstruction were persistent symptomatic SC joint instability and irreparable SC joint ligaments. To reconstruct the SC joint, another piece of tendon (usually a knee hamstring tendon) is taken from elsewhere in the body and sewn through the clavicle and sternum (breastbone). The graft is then tightened appropriately so as to stabilize the SC joint. Metal pins and wires should be avoided when fixing the SC joint since there is a risk for puncturing vital organs that reside near the breastbone. The doctors hypothesized that this reconstruction technique restores SC joint stability and provides good shoulder function along with high patient satisfaction.

COMPLICATIONS FOLLOWING BICEPS TENODESIS

Biceps tendon disorders are commonly associated with rotator cuff tears, but are also thought to be pain generators within the shoulder due to inflammation or irritation, instability, or tendon tearing. The biceps tendon attaches the biceps muscle to the bone within the shoulder joint. The biceps tendon then passes out from the joint through the

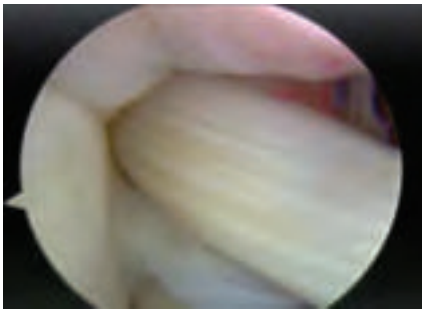
rotator cuff, down the bicipital groove, providing tension for your biceps muscle. When a biceps tendon ruptures, it may cause a Popeye deformity, which is a bulge of the biceps muscle towards the elbow.

Typically, patients over 40 undergoing shoulder surgery with a diseased or torn biceps will be treated with a biceps tenodesis. A biceps tenodesis entails cutting the anatomical attachments of the biceps within the joint from the top of the glenoid, and pulling the tendon out of the joint through the bicipital groove and reattaching it to the upper part of the humerus. The tendon is reattached into the bone using a small bioabsorbable screw, which is then left the bone. It takes at least six weeks for this tendon to heal to the bone.

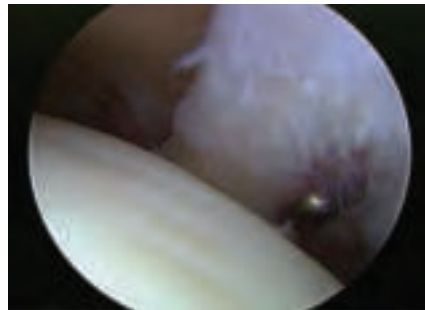
Dr. Peter Millett, along with Visiting Scholars, Dr. Daniel Rios from Mexico and Dr. Frank Martetschläger from Germany, wanted to determine what the biceps tenodesis complication rates are. They looked at 636 patients who underwent a biceps tenodesis performed in the past five years by Dr. Millett, using the same technique for each, to see how many patients experienced a complication. Their hypothesis was that a biceps tenodesis is safe and effective for treating biceps pathology with low complication rates in a large cohort. Of the 636 patients, 491 met the inclusion criteria of having the same surgical tenodesis technique, no prior biceps treatment or rupture, and a postoperative physical examination by the surgeon.

Of the 491 patients, 11 patients had documented complications. The overall complication rate was 2.4 percent, which validates the hypothesis that a biceps tenodesis is a safe and effective surgical treatment for biceps pathology with low complication rates.

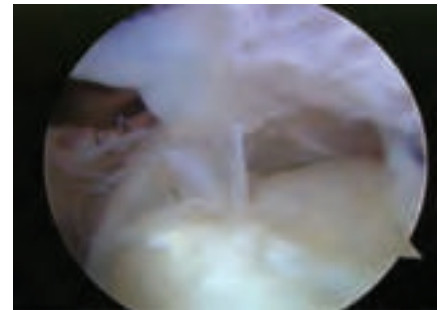




1st photo: right shoulder healthy biceps.



2nd photo: Tendinopathy of the long head of the biceps in the left shoulder.



3rd photo: Open tenodesis of the long head of the biceps with a tear of the biceps anchor.

ANKLE AND FOOT RESEARCH

Validate Foot and Ankle Scores

The goal of the Steadman Philippon Research Institute, and more specifically, the Center for Outcomes-Based Orthopaedic Research, is to improve patient care through outcomes-based medicine research, which relies on outcomes measures, or scoring systems, to track our patients' progress over time. In order to make sure we are getting accurate feedback from our patients, we must use the proper scoring systems, which must be reliable and valid. Validation of scores is a very important step in the collection of data. In order for validation, an outcomes measure must pass certain tests. For example, a score must be able to measure what it is intended to measure, such as a functional score actually measuring function, or a pain scale accurately reflecting a patient's true level of pain. A score must also be able to measure both high and low scores, without having the vast majority of patients fall above or below the patient average. In other words, a score should be able to measure outcomes for all patients, without having any one patient top out or bottom out on the scale. An outcomes score must also be able to be repeated multiple times in order to account for reproducibility. A score must also be able to measure change in the patient's progress.

Once a scoring system is validated, we are able to implement this scoring system and have confidence that we are obtaining an accurate assessment of our patients and where they are in the recovery process. Once we have obtained these data, we are able to analyze and relay the results to the physicians. This process creates a feedback loop, allowing the physicians to understand how their patients are doing and how their results can be improved.

Various outcomes scores have been validated in the knee, as well as other joints. However, the foot and ankle lack a validated outcomes score with which to track outcomes. Since SPRI began collecting foot and ankle data when Dr. Clanton first arrived, we have been excited to begin this area of research. Currently, we collect 10 different scores from our

patients with foot and ankle injuries. Our goal is to validate one of these foot and ankle scores and use that score for each outcomes study we design. By using the same score each time, physicians and patients alike will be able to compare their results with other institutes and patients, allowing our patients to gauge where they are in the recovery process. This process of outcomes measures validation allows our physicians to accurately monitor their patients in real time, each step of the way.



Kelly Adair Guiding the Vision of SPRI's Surgical Skills Laboratory

By Jim Brown, Executive Editor, *SPRI News*

They come to Vail, without fanfare, from all over the world, and they are not here to ski. They are surgeons, scientists, fellows, scholars, and medical professionals who disappear into the Steadman Philippon Research Institute's Surgical Skills Laboratory.

When they emerge a day or two (or longer) later, they will have completed intensive courses that allow them to advance their knowledge of orthopaedic surgery, master their surgical skills, and test products that may change the course of treatment for millions of patients.

The person who coordinates these conferences from start to finish is Kelly Adair, director of the Surgical Skills Laboratory. He has been on track to assume a position of this magnitude since his college days, when he earned a degree in integrative physiology (pre-med) at the University of Colorado Boulder.

"I had worked as a personal trainer while in school full-time and, at one time, was moving in the direction of becoming a doctor or a physical therapist (DPT)," says Mr. Adair. "I changed my mind, but I was still passionate about health, wellness, and movement. I worked for a start-up before it was sold, then became a sales representative for a medical device company."

Mr. Adair spent 90 percent of his time in the operating room, working with doctors, nurses, and technicians. Then he was approached about a position to set up, market, and manage the day-to-day operations of a new surgical skills laboratory at SPRI. Mr. Adair was very interested.

On the Frontier of Preventive Medicine

"I was aware of Steadman Philippon and its reputation as an orthopaedic research center of excellence," he says, "but what really caught my attention was the Institute's role in advancing the prevention of sports injuries. SPRI was already on the edge of that new frontier, and I am extremely fortunate to get the opportunity to be a part of the process."

The Surgical Skills Laboratory opened in February 2011 and has been described as one of the most advanced facilities of its kind in North America. It houses 10 state-of-the-art arthroscopic wetlab stations and drop-down panels for each station that contain water, suction, electricity, and audio-visual systems. The system makes it possible for participants to view demonstrations on monitors within the lab, conference rooms, and dissection area. There are 10 video towers, freezer storage space, a steam generator for instrument cleaning, fume hoods for ventilation, handheld instruments, teleconference capabilities, and three conference rooms.

"The lab gives physicians the unique opportunity to practice both arthroscopic and open sports medicine procedures on cadaveric specimens," explains Mr. Adair. "The most satisfying aspects of my job are being able to aid surgeons with a hands-on learning experience and to watch them work with Steadman Philippon Fellows on new techniques and devices."

As many as 60 to 80 surgeons have rotated through the lab's 1,500 square foot facilities at one time, some listening to lectures, others in the lab practicing new techniques. Among the first companies to take advantage of the Surgical Skills Laboratory are Smith & Nephew, Arthrex, Conmed/Linvatec, Small Bone Innovations, Stryker, KFx, Memometal, Wright Medical, Sonoma Orthopedics, and BioMet Sports Medicine.

"Each session is a challenge for me," Mr. Adair adds. "Instrumentation and surgical procedures are always changing, always evolving. To do the best job I can, I need to be familiar with those changes."



Kelly Adair

Photo: Barry Eckhaus

Mr. Adair is also charged with marketing the services of the SPRI Surgical Skills Laboratory to the rest of the world. He produces print, video, and online presentations (<http://www.sprivail.org/surgical-skills-laboratory>), and he uses his experience in medical sales to communicate with national and international medical groups, associations, and companies.

Above and Beyond

"At SPRI, we want to go above and beyond the services provided by other labs. With the help of my colleagues, surgeons can walk in and start practicing immediately. Everything has been set up for them in advance, which gives them more practice time and a more productive lab experience. It's a feature that sets our lab apart from others. The more surgeons get to fine tune their skills with new products, techniques, and procedures, the more they will be able to serve the medical community and its patients," says Mr. Adair.

On his role as the first director of the Surgical Skills Laboratory: "It's an honor and an opportunity of a lifetime to be part of such a unique and talented team."

Surgical Skills Laboratory

By Kelly Adair, Director, Surgical Skills Laboratory

Advancing Orthopaedic Surgery with the Latest Techniques and Tools in Our Newly Renovated Surgical Skills Laboratory

Innovation has arrived at the Steadman Philippon Research Institute's Surgical Skills Laboratory with one of the most advanced laboratories in North America. Amid recent renovations, thanks to many generous contributions from private donors and industry, as well as our continued partnership with Vail Valley Medical Center, the SPRI laboratories are at the peak of advancing orthopaedic medical education. The new Surgical Skills Laboratory has been off to a great start. We have hosted several different labs for visiting surgeons, scholars, Fellows, and medical companies.

Medical education is at a high point in the industry, and continually increasing throughout the world. Companies have private laboratories at their headquarters and staff dedicated specially to managing and operating multiple courses annually. Specifically, the more we can hold hands-on cadaver labs for surgeons, the better the outcomes for the future. Practically, the labs will further innovation and advance less invasive procedures that will benefit every patient in the long

run by creating more reproducible, highly trained surgeons throughout the world. Moreover, this will further reduce the costs for patients who need very specific procedures that are not currently reimbursed by insurance companies.

A total of 20 outside company labs have been held at our facilities, and more are expected. The goals of various company labs range from physician training to product development. Large multi-station surgeon training courses provide a highly valuable, hands-on experience for both orthopaedic sports medicine Fellows and newly experienced surgeons to practice techniques with our Institute's highly respected surgeons. Product development labs provide a unique 'brainstorming' setting with the goal of helping to further advance the design of orthopaedic-related implants and products. Surgical Skills labs allow for practice and reproducibility of surgical techniques, eventually increasing patient safety within the field of orthopaedic (sports) medicine.

We have hosted labs for all major joints of the human body, such as the knee, hip, shoulder, elbow, foot and ankle, and hand and wrist, significantly increasing continuing education opportunities for physicians. For example, we hosted a two-day course for Small Bone Innovations, Inc., attracting



surgeons throughout the country to practice Scandinavian Total Ankle Replacement (S.T.A.R). We have also continued to host several hip arthroscopy courses with Smith & Nephew. Medical education courses continue to attract visiting clinicians from all over the world. Courses allow them the opportunity to further advance and master their surgical skills in arthroscopy and related orthopaedic procedures with hands-on simulations, while also allowing visiting surgeons the opportunity to learn from one of our expert surgeons who serve as on-site instructors. The Institute has hosted labs for, among others, Conmed/Linvatec, Arthrex, Inc., KFx Medical, Memometal, Inc. (Stryker), Wright Medical, Sonoma Orthopedics, and BioMet Sports Medicine.

Additionally, the more revenue we can generate from labs, the more we can independently support our fellowship program, research, and education, and continue to be the world leader in research into the causes, prevention, and treatment of orthopaedic disorders. We anticipate having up to 1,000 surgeons visit our lab annually. The more surgeons we can reach out to, the better the outcome for the patients in the operating room. Thus, we are able to advance our mission of “Keeping People Active” and educating the worldwide orthopaedic community, one person at a time.

Thank you to all of our staff for your continued support of laboratory functions. The Surgical Skills Laboratory could not function without you.



Two arthroscopic stations with our custom drop-down panels.



Live demonstration of a five-station arthroscopic hip lab.



Institute's 10 station surgical skills laboratory with arthroscopic video towers.



A group of surgeons participating in a total ankle replacement.

Department of BioMedical Engineering: New Name, New Research, New Recognition

As the Steadman Philippon Research Institute continues to evolve, the name of the Biomechanics Research Department has been changed to the Department of BioMedical Engineering.

“Due to our recent growth and the expansion of our subdisciplines and specialized methodologies, the change is very timely,” says Coen Wijdicks, Ph.D., director of the Department and senior staff scientist. “We look forward to the opportunities this change will bring, and we believe it will allow SPRI to be more competitive for grants, industry relations, and overall recognition in this exciting field of research.”

The newly named Department of BioMedical Engineering includes the subdisciplines of biomechanics, musculoskeletal mechanics, biomedical imaging, and orthopaedic engineering.

New Rotator Cuff Research

Researchers in SPRI’s Department of BioMedical Engineering have recently completed a study on the best procedures for repairing massive rotator cuff tears. The results were presented in San Francisco at the annual meeting of the Orthopaedic Research Society. According to the Institute, a massive rotator cuff tear is defined as a tear greater than 5 cm in length or one that involves two or more rotator cuff tendons. The study concluded that double-row and augmented double-row surgical procedures yield stronger, longer-lasting outcomes than traditional single-row approaches.

Rotator cuff injuries and tears are common causes of shoulder pain and weakness. Treatment for rotator cuff tears is why individuals will often see a shoulder surgeon. According to the American Academy of Orthopaedic Surgeons, more than two million people in the U.S. go to their primary care physician and specialty clinics because of a rotator cuff problem. Recent literature suggests that between nine and 25 percent of these injuries were treated arthroscopically.

During the study, which was performed in the new biomechanical testing laboratory on the SPRI campus in Vail, Colorado, 20 specimens were placed into one of four groups. Each had been treated using one of the following three rotator cuff repair procedures: a single-row rotator cuff repair, a double-row repair, or an augmented double-row repair that uses collagen bio-implants (patch) to help provide the healing tissue a secure scaffold to grow into. The fourth group consisted of the intact, or non-injured, condition.

In order to conclude what the best procedures for repairing massive rotator cuff tears are, scientists tested each massive rotator cuff tear repair using state-of-the-art biomechanical science technology that applies motion and pressure on each specimen. This specific testing method was used to determine which technique was strongest and had the greatest long-term success (Fig. 1). Scientists developed a unique testing protocol that simulates a typical rehabilitation regimen following massive rotator cuff tears.

According to Dr. Wijdicks, “The study sheds light on several theories surrounding

the best procedures for repairing massive rotator cuff tears. Because the biomechanical tests were performed in real-time, we were able to visibly see how well each surgical technique performed during our testing procedure. What we found is that for massive rotator cuff tears where the double-row and the augmented double-row techniques were used, repairs endured

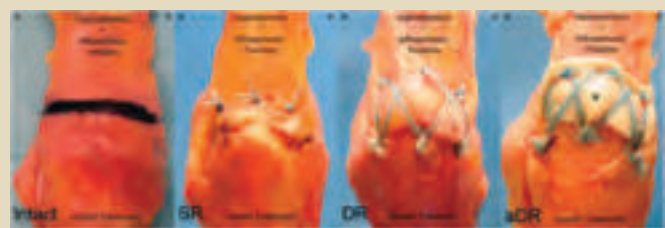
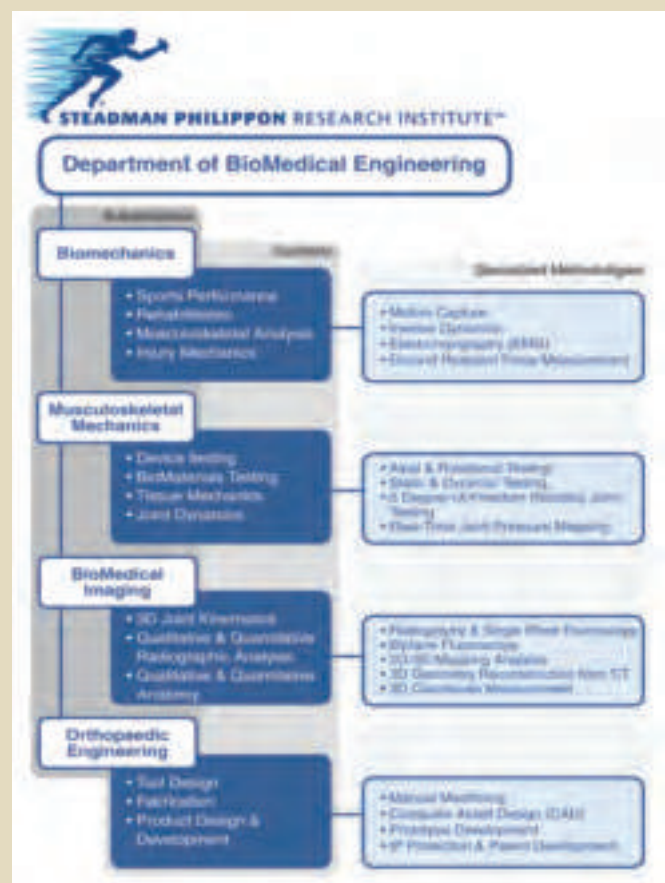
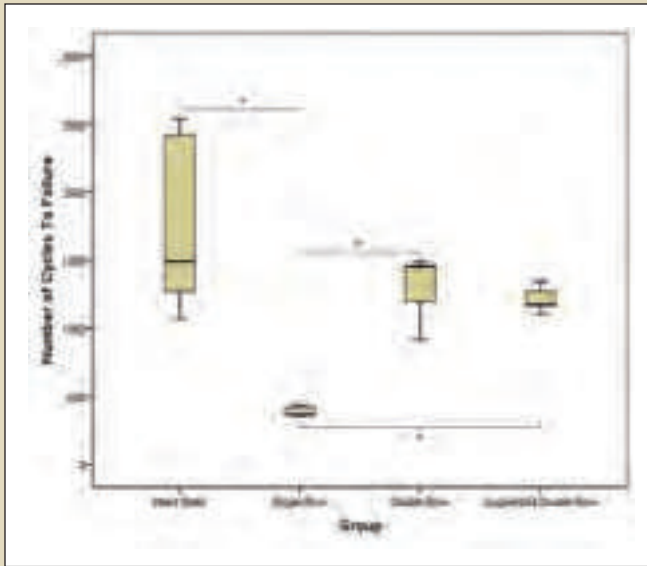


Fig. 1
Four rotator cuff specimens, left to right: intact, single-row rotator cuff repair, double-row repair, and augmented double-row repair with collagen bio-implant.



Graphical representation of the testing data, showing how an intact rotator cuff compares to varying repair techniques. The double-row technique was insignificantly superior to the single-row technique when compared to the intact state.



The biomechanical tests were performed in real-time using the Instron Electro-Puls E1000, allowing researchers to visibly see how well each surgical technique performed during testing procedures.

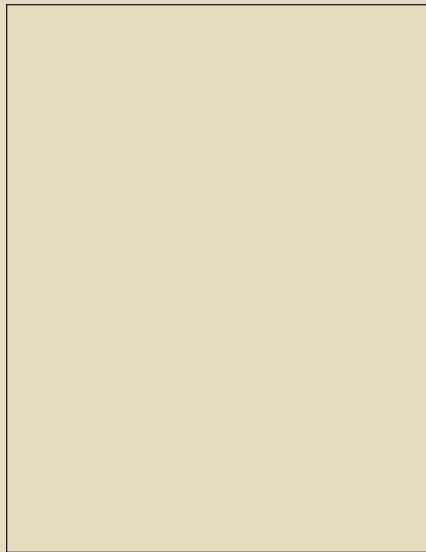


Illustration of a left knee in the biomechanical testing apparatus during application of a simulated pivot shift. During applied valgus (a) with internal rotation (b), the electromagnetic transmitter (c), positioned above the knee, generated electromagnetic pulses that the sensors (d) received to determine three-dimensional positioning.

Credit: Knee Surgery Sports Traumatology Arthroscopy

significantly more cycles to failure and had higher maximum load ranges than the single-row repairs, and were actually as strong as healthy intact rotator cuffs.”

Prior to the study, there were also concerns among orthopaedic specialists that augmentation of the repair with a collagen patch would negatively influence the overall repair quality. However, it was determined that augmentation with a collagen patch did not have any adverse biomechanical effects on the strength of the repair.

“The study offers hope for patients who suffer from massive rotator cuff injuries, and will allow orthopaedic surgeons better insight and more precise surgical techniques to treat these injuries. This new information from our research efforts will ultimately translate to better outcomes for the patient,” says Dr. Peter Millett, director of Shoulder Surgery at the Steadman Clinic and a pioneer in the development of double-row arthroscopic rotator cuff repair surgery and rotator cuff augmentation with collagen patches.

New Knee Research

Robert LaPrade, Ph.D., M.D., chief medical research officer at SPRI, and Coen Wijdicks, Ph.D., are among the co-authors of “Evaluation of a Simulated Pivot Shift Test: A Biomechanical Study,” published online in the November 11, 2011, edition of *Knee Surgery, Sports Traumatology, Arthroscopy*.

Anterior cruciate ligament (ACL) reconstruction procedures have led to an increased interest in quantifying the knee’s stability. The pivot shift test is a complicated, specific test of ACL deficiency. The purpose of this study was to compare different simulated pivot testing methods using 12 cadaver knees in a laboratory setting.

Dr. LaPrade, Dr. Wijdicks, and fellow researchers Lars Engebretsen, and Colin Anderson, concluded that the combination of internal rotation (rotating the knee toward the center of the body) and valgus torques (bending or twisting outward) best recreated the movement that occurs in the pivot shift test in a laboratory environment.



Department of BioMedical Engineering

Coen Wijdicks, Ph.D., Department Director, Senior Staff Scientist; Erik Giphart, Ph.D., BioMotion Laboratory Coordinator, Senior Staff Scientist; Kyle Jansson, B.S., Senior Mechanical Engineer; Mary Goldsmith, M.Sc., Robotics Engineer; Sean Smith, M.Sc., Research Engineer; Max Michalski, M.Sc., Research Assistant; Kevin Campbell, B.S., Research Assistant; Katharine Wilson, M.Sc., Research Assistant; Nicholas Kennedy, B.S., Research Assistant

In 2011, three themes were apparent in the Department of BioMedical Research. The first was “Evolving,” as evidenced by the change in the Department’s name, expanding technical responsibilities of staff members, and challenging new areas of research. “Excellence” was reflected by the number and quality of peer-reviewed publications, presentations, patents, and collaborative efforts between the Steadman Clinic and Steadman Philippon Research Institute, as well as with institutions in the U.S. and abroad. The third theme—“Expectations”—was seen as the Department continued to meet the lofty expectations of the scientific community, and to meet the needs of patients who benefit from their biomedical research.

EVOLVING: CHANGES

As the Steadman Philippon Research Institute continued to evolve, the name of the Biomechanics Research Department was changed to the Department of BioMedical Engineering. Because of recent growth and the expansion

of subdisciplines and specialized methodologies, the change was timely and is expected to make the Department more competitive for grants, improve industrial relations, and lead to greater overall recognition. The newly named Department of BioMedical Engineering includes biomechanics, musculoskeletal mechanics, biomedical imaging, and orthopaedic engineering.

EXCELLENCE: ACCOMPLISHMENTS

Studies were proposed, planned, or conducted that involved:

- best procedures for repairing massive rotator cuff tears
- a comparison of different simulated pivot testing methods
- alterations in glenohumeral kinematics
- glenoid inlay CT
- coracohumeral distance
- biplane shoulder validation
- rotator cuff biplane
- glenoid inlay stability
- single bundle versus double bundle ACL reconstruction
- hip kinematics in ice hockey goaltenders
- CT bone geometry reconstruction
- biplane fluoroscopy matching
- translation of humeral head center relative to glenoid



Robert F. LaPrade, M.D., Ph.D., Coen A. Wijdicks, Ph.D., Kyle Jansson, Mary Goldsmith, M.Sc., and J. Erik Giphart, Ph.D.

- acromioclavicular distance as function of elevation angle
- biomechanics of lateral meniscus tears
- biomechanical evaluation of repair strength of clavicle
- biomechanical comparison of eight tibial soft tissue devices for ACL fixation
- reducing injuries in snowboarding
- analysis of MCL ligament knee augmentation repair
- comparisons of two knee braces
- treatment of hip injuries with platelet-rich plasma
- And many more...

Peer-reviewed publications provide credibility among peers, reach large audiences, are placed into the National Library of Medicine, and share the findings of research conducted at SPRI with physicians and scientists around the world.

PUBLICATIONS, PATENTS, GRANTS

In 2011, the Department produced 19 high-impact, peer-reviewed publications—a rate of 1.6 publications per month—in publications such as the *American Journal of Sports Medicine*, *Sport Rehabilitation*, *Hand Surgery*, *Journal of Orthopaedic Research*, *Knee Surgery*, *Sports Traumatology*, *Arthroscopy*, and *The Journal of Bone and Joint Surgery*. Out of 19 total SPRI/BioMedical publications, 10 were in the *American Journal of Sports Medicine*. With the newly built laboratories in 2012, the number of SPRI BioMedical Engineering publications, including those submitted, in revision, accepted, and published, has increased.

In addition, 12 podium and 13 poster presentations were made at national and international conferences. The Department submitted two patents and received close to \$500,000 in outside academic and industry-related grants.

COLLABORATIVE EFFORTS

The Department collaborated with Steadman Clinic physicians (J. Richard Steadman, M.D., Marc Philippon, M.D., Peter Millett, M.D., Robert LaPrade, M.D., Tom Hackett, M.D., Thomas Clanton, M.D., and Randy Viola, M.D.); Sports Medicine Fellows (Jeffrey Padalecki, M.D., Robert Boykin, M.D., Benjamin Petre, M.D., Christian Balldin, M.D., and Norman Waldrop, M.D.); ATC Fellow Jennifer Wages, ATC, Ph.D.; International Research Scholars (Frank Martetschläger, M.D., Daniel Rios, M.D., Cathrine Aga, M.D., Peter-Paul de Meijer, M.D., and Lourenco Peixoto, M.D.).

National collaborators included Colorado State University, the U.S. Ski and Snowboard Association, and the Hospital for Special Surgery in New York. International collaborative research efforts were conducted with the University of Oslo, Norway, and Aarhus University in Denmark.

COMMUNITY OUTREACH

The Department also continued in its role of providing special guidance from SPRI scientists for young scholars. Seventh-grader Sydney Sappenfield (PAGE 68) won the gold medal in the regional state science fair. Sappenfield, along with several classmates, won prizes for Most Scientific and Best Overall projects, and they were among more than 100 seventh- and eighth-grade students from across the state chosen to participate in the Annual Meeting of the Colorado Wyoming Junior Academy of Science.

Travelers who fly on Delta Airlines and who read Delta's in-flight magazine, *SKY*, got helpful advice from a variety of sports science researchers, including SPRI's Coen Wijdicks, Ph.D. Among the eight tips for avoiding sports injuries was the following from Dr. Wijdicks: "Catch injuries the first time. A seemingly innocuous twist of the knee could require the usual rest-ice-compression-elevation treatment, or a lot more. An acute injury that is not treated properly can become chronic and lead to joint instability and cartilage damage. The most common risk factor for injuries is a prior injury."

EXPECTATIONS: PROJECTIONS FOR THE FUTURE

The Department aims to continue a balanced approach of research, measurable outcomes, collaboration with national and international institutions, and community outreach. This "high-risk / high-reward" approach requires generous continued support of the Institute and the Department, as well as continued high-quality production from its staff.

The Department of BioMedical Engineering will maintain its forward momentum in 2013, and will continue to fulfill its mission of 1) advancing patient care by focusing on injury mechanisms, 2) developing and validating novel surgical treatment and rehabilitation techniques, and 3) teaching advanced research protocols using state-of-the-art biomedical research techniques and technologies.

Imaging Research

Charles P. Ho, M.D., Ph.D., Director, Imaging Research; Eric Fitzcharles, M.D., Imaging Research Fellow; Sean Smith, M.D., Imaging Research Fellow; Erin Lucas, M.Sc., Senior Project Engineer; Rachel Surowiec, M.Sc., Imaging Research Assistant

In 2011, Imaging Research continued to develop and evaluate noninvasive imaging techniques of the joints for the purpose of improving clinical diagnosis, directing and monitoring clinical treatment and outcomes, and enhancing the clinical relevance of research conducted in all of the departments at the Steadman Philippon Research Institute.

STAFF

Eric Fitzcharles, M.D., completed his one-year term as an Imaging Research Fellow in July 2012, and returned to his practice, between Lexington, Kentucky and Edwards, Colorado. Sean Smith, M.D., began his tenure as an Imaging Research Fellow in August 2012. Each Imaging Research Fellow is a board-certified radiologist. Erin Lucas, M.Sc., continued her work as senior project engineer, as did second-year research assistant, Rachel Surowiec, M.Sc.

TECHNOLOGY AND EQUIPMENT

The Imaging Research database continued to expand at the rate of approximately 200 magnetic resonance image (MRI) clinical exams per month. Data are derived from Steadman Clinic patient evaluations, which include imaging as an integral component of evidence-based medicine practiced at the Clinic and of research conducted at SPRI.

RESEARCH

Quantitative MRI mapping refers to special magnetic resonance image sequences that are able to detect microscopic changes in tissue health that occur before damage can be visually detected. The SPRI Imaging Research Department is conducting several research studies to improve the clinical usefulness of these scans so that tissue damage in patients can be detected before progressing to more serious damage.

Research Imaging continued the process of quantifying imaging diagnoses of articular cartilage and soft tissue health—specifically involving cartilage of the hip, knee, and rotator cuff of the shoulder. Studies used asymptomatic (in terms of tissue health) volunteer subjects to collect normative baseline data. This information is used for the purpose of identifying and quantifying biomarkers. The Department also began to enroll Steadman Clinic patients being treated for knee and hip disorders in order to compare their data with the normative base.



Charles P. Ho, M.D., Ph.D.

Tissue samples of cartilage waste recovered during normal arthroscopic treatment are being analyzed at Colorado State University for biochemical properties, and then compared to quantitative imaging of the cartilage performed preoperatively at the Clinic and Institute (See Collaborative Efforts).

All of these efforts are part of the Department's imaging mapping research that involves quantification, reproducibility, and follow-up of articular cartilage early degeneration by using imaging biomarkers.

The results of these studies will allow Imaging Research and other SPRI departments to draw on the findings and compare them with the ongoing collection of data with every patient seen at the Clinic. Emphasis on reproducibility of the quantitative mapping should then allow following of each patient for response to treatment received at the Clinic, as well as disseminating the Clinic's and Institute's results and data for use by other orthopaedic care centers and practitioners throughout the country and world.

The Department advanced its screening studies of hip injuries in young athletes and adults. Subjects came from Vail Valley youth leagues and clubs. The goal is to understand the prevalence and evolution of potential problems (such as overuse) that are associated with people who participate in sports-related activities such as hockey players and skiers. Among the SPRI physicians who collaborate with Dr. Ho

and his staff are Dr. Richard Steadman, Dr. Marc Philippon, Dr. Robert LaPrade, and Dr. Peter Millett.

COLLABORATIVE EFFORTS

Siemens continued its role as the major collaborative partner with Imaging Research by providing funding for the SPRI Imaging Research Fellowship and by supporting and collaborating with the Department's work of imaging and mapping research, and identifying biomarkers associated with tissue health.

SPRI Imaging Research also continued its association with Colorado State University. Some of the cartilage waste components that are recovered as part of normal arthroscopic treatment are sent to the university for analysis of histology and to determine the biochemical properties. The components can then be compared to arthroscopic findings and imaging mapping results—all toward the goal of validating the quantification and mapping being conducted in Imaging Research.

Beginning in 2012 the Ken and Anne Griffin Foundation will fund the Griffin Visiting Scholar Program for Clinical Sports Medicine MRI (Pg 8).

The process of identifying and recruiting the first Griffin Visiting Scholar has already begun, and the physician who is selected for the position will begin his or her work in 2013. That person will read and review clinical patient MRI exams, assist in developing and validating sports medicine MRI protocols and scoring systems, and collect imaging data to be incorporated into SPRI's existing clinical and operative database.

PROJECTIONS

Imaging Research will continue its efforts toward using MRI procedures in combination with other imaging modalities such as computed tomography (CT) and ultrasound to evaluate noninvasively the health, injury, and response to treatment of the joints and muscles of Clinic patients and all active people.

The Department will also continue adding imaging data to SPRI's database and will collaborate with the other departments at the Institute, as well as with institutes and research facilities throughout the United States and the world.



Visiting Scholars Program Brings German Physician to the Institute Dr. Frank Martetschläger named 2011-2012 Arthrex European Visiting Scholar

By Jim Brown, Executive Editor, *SPRI News*

After six years of medical school at the University of Würzburg in Germany and six more years as a resident at hospitals in Mannheim, Heidelberg, and Munich, Dr. Frank Martetschläger was on schedule to begin his career as a physician. Then a series of events occurred that changed the direction of his medical education.

Early in 2011, he was in Vail to ski with friends, but he was also able to visit the Steadman Clinic and the Steadman Philippon Research Institute. "I knew about the Clinic and the Research Institute because many of the European soccer players who had been injured were sent to Vail for treatment. I also knew two physicians in Germany who had spent time at Steadman Philippon, and they had nothing but good things to say about it."

Developing Clinical Skills and Research Capabilities

"When I saw the facilities and met Dr. Peter Millett and others at the Institute, I was really impressed with the people, the facilities, and the opportunities for developing clinical skills, as well as engaging in research," says Dr. Martetschläger.

By the time Dr. Martetschläger returned to Germany, the AGA-Society for Arthroscopy and Joint Surgery and SPRI were in the process of selecting the next Arthrex European Visiting Scholar. Arthrex, Inc. is an orthopaedic medical device company committed to research and advancing the knowledge of the world's medical community.

Dr. Martetschläger applied for the Visiting Scholar position, and in May 2011 was notified by the Society that he had been selected as the recipient over other orthopaedic surgeons from throughout Europe.

"I was very excited going there for a year, working with Dr. Millett, who is one of the most famous and best shoulder surgeons in the world," he remembers. Four months later, he began his one-year term at Steadman Philippon.

First Impressions

"My first impressions of the Clinic, the Research Institute, and Vail were very positive," says Dr. Martetschläger. "I was given a warm welcome by Dr. Millett and his wife, Sarah, as well as the whole Steadman Clinic and SPRI team, and felt at home very quickly. I could not have imagined that Vail was such a great place to be in the summer. I'm a passionate skier, but in August and September I enjoyed hiking in the mountains and using my mountain bike."

Weekdays at SPRI, however, are not about skiing, hiking, and mountain biking. Like other visiting scholars, Dr. Martetschläger is usually at work by 7:00 am, ready to put in a day that might last 10 to 12 hours. Assisting Dr. Millett, he sees patients, observes and assists in the operating room, conducts clinical and biomechanical research, and writes scientific papers.

Dr. Martetschläger and Dr. Millett are conducting research to determine the best technique for stabilizing a shoulder that has been injured. He hopes to complete the research before he returns to Germany and, with others on the SPRI research team, to submit it for publication.

"We at SPRI are looking forward to the excellent research that Dr. Martetschläger has proposed to complete during his scholarship year. Early results have shown some promising results that pertain to labral repairs of the shoulder," says Coen Wijdicks, Ph.D., director of the Department of BioMedical Engineering.

"It's a perfect situation here," says Dr. Martetschläger, "We have the Clinic, Howard Head Sports Medicine, and the Research Institute all in the same place. At home, we have to do our research separately from our regular duties, and that makes it much more difficult."

Monday Morning Meetings

"All of the physicians, Fellows, and visiting scholars, including Dr. Steadman, attend Monday morning to discuss their work and ongoing research. You've grown up hearing about Dr. Steadman and his knowledge of surgery and biomechanics, then one day you



Frank Martetschläger, M.D.

are in the same room talking with him," says Dr. Martetschläger.

"Dr. Steadman, Dr. Millett, and the other physicians and scientists are always available to talk with you and answer any questions. They are the same way with patients. Whether they have the time or not, they take time to sit down and talk with each person."

Life-Changing Experience

"The time that I am spending here will change my personal and professional life," says Dr. Martetschläger. "It is one of the special years in my life and I am grateful to the Institute and to Dr. Millett for making it possible."

"I would tell anyone who suffers an injury or who has an orthopaedic condition that requires medical attention to consider coming here. Trust these men and women. They really know what they are doing, based on the latest research."

"For those who might consider supporting the work of the Research Institute," Dr. Martetschläger concludes, "I can tell them that their money is not wasted. It is used for research that makes surgical outcomes better and that helps keeping people active. It would be a great investment."



Visiting Scholar

The European Visiting Scholar, developed and sponsored by Athrex, Inc., has become the model for our Visiting Scholars program. The SPRI Visiting Scholars programs are sponsored by corporate and individual donors. Our program was developed in conjunction with Arthrex, Inc., an orthopaedic medical device company. Arthrex's founder and president, Reinhold Schmieding, has had a long-time interest in education. Mr. Schmieding approached us with an idea for educating a European orthopaedic surgeon with interest in research, committed to funding it, and the Visiting Scholars program was created. Mr. Schmieding commented, "Arthrex is pleased to contribute annually to the Institute. The sponsoring of a European research fellow exemplifies Arthrex's commitment to orthopaedic research to advance knowledge of the global medical community and to helping surgeons treat their patients better." Arthrex, Inc., is annually sponsoring the European Visiting Scholars program, and due to its success, Mr. Jorge Paulo Lemann is supporting our Brazilian Visiting Scholar. These scholars learn new surgical techniques and conduct research, which is submitted for publication in leading orthopaedic journals.

WELCOME 2011-2012 FELLOWS

Eight New Physicians Introduced

Each year, nine young orthopaedic surgeons are selected, from a field of more than 150, to participate in 12 months of vigorous training in the Steadman Philippon Sports Medicine Fellowship Program. Our goal is to prepare them to be leaders in the field of orthopaedic sports medicine for the remainder of their careers. Many go on to hold high-level faculty positions at top medical schools.

In 2010, we added two Fellows to our program when we welcomed the Institute's first Foot and Ankle Fellow and the world's first Sports Medicine Imaging Research Fellow. In addition, we now have three Visiting Scholars, who are in essence research fellows from other countries. All eleven (Fellows and Visiting Scholars) are being given a unique opportunity to perform research in their respective areas of interest, including BioMedical Engineering, Outcomes-Based Orthopaedic Research, Imaging Research, and Translational and Regenerative Medicine Research. Once every 18 months after that, they will return with other past Fellows for further education and to exchange the additional knowledge they have gained since completion of fellowship training.

The Institute currently maintains a network of more than 180 Fellows in communities around the world who serve in academic positions at leading universities and in private practices.

Adam W. Anz, M.D.

Dr. Anz spent his first 18 years of life in Auburn, Alabama. He graduated summa cum laude from Vanderbilt University with a degree in mathematics, and was also a member of Phi Beta Kappa and Sigma Chi. He was awarded an Alabama Merritt Scholarship for medical education, and attended the University of South Alabama College of Medicine, where he graduated Alpha Omega Alpha and second in his class. His orthopaedic residency training was performed at Wake Forest University in Winston-Salem, North Carolina, with research including 3-D CT reconstruction for identification of mild hip dysplasia and a biomechanical project involving pitchers and elbow injury. Dr. Anz's strongest interest has been in cartilage regeneration, for which he traveled to Malaysia for three weeks and aided a recent publication of a case series utilizing a novel method with peripheral blood progenitor cells. He has been working at Wake Forest to initiate a randomized controlled trial involving this method, including the acquisition of safety and quality data for preparation of an Investigational New Device application from the FDA.

B. Christian Balldin, M.D.

Dr. Balldin graduated summa cum laude and a Brother Daniel Lynch Scholar from St. Edward's University with a Bachelor of Arts degree. He also graduated magna cum laude from the University of Texas at San Antonio with a Bachelor of Science degree. He played NCAA soccer his entire collegiate career, and was involved in developing youth soccer talent throughout his college years. He attended the University of Texas Medical School in Houston, where he was named a Merck Scholar, and then performed his orthopaedic residency at the University of Texas Southwestern Medical Center in Dallas. During his time in Dallas, Dr. Balldin covered many local schools and teams during athletic events. His research interests have included the biomechanical testing of fixation techniques in tendon transfers.

Robert E. Boykin, M.D.

Dr. Boykin graduated as a Morehead Scholar with highest distinction and Honors from the University of North Carolina at Chapel Hill, where he received a Bachelor of Science degree in biology and was a member of Phi Beta Kappa. While an undergraduate, he completed an Outward Bound Course in Colorado and Utah focusing on mountaineering and canyoneering. He then received his medical degree from Vanderbilt University, where he was elected president of the Alpha Omega Alpha Honor Medical Society and vice president of his medical school class. Dr. Boykin completed residency training in the Harvard Combined Orthopaedic Residency Program, where he served as administrative chief resident for the Massachusetts General Hospital. His research interests include nerve injuries and trauma of the shoulder, and his work has yielded numerous publications and presentations. After his fellowship in Vail, he plans to travel to Annecy, France, to work with Dr. Laurent Lafosse studying shoulder surgery at the Alps Surgery Institute.

Mark R. Geyer, M.D.

Dr. Geyer graduated summa cum laude from Baylor University, where he earned a Bachelor of Arts degree in philosophy and membership in Phi Beta Kappa. He then graduated medical school from Baylor College of Medicine. He completed an orthopaedic surgery residency at Duke University where he helped provide team coverage for local high school athletes and collegiate athletes at Duke

University and North Carolina Central University. Dr. Geyer has published in the *Journal of the American Academy of Orthopaedic Surgeons*, among other journals, and he has co-authored two book chapters. His interests include open and arthroscopic shoulder reconstruction, as well as ACL reconstruction and rehabilitation.

Jeffrey R. Padalecki, M.D.

Dr. Padalecki graduated magna cum laude from St. Mary's University, where he was named a presidential scholar and was captain of the basketball team in his final season. He completed medical school at the University of Texas Medical School at Houston. During his orthopaedic residency at the University of Texas Southwestern, he served as assistant team physician to local high school, collegiate, and semi-professional athletes. While in residency, he was elected by Southwestern faculty to attend the American Orthopaedic Association Resident Leadership Forum. Dr. Padalecki has co-authored publications in the *Journal of Orthopaedic Trauma* and the *Journal of the American Academy of Orthopaedic Surgeons*. His research efforts have been presented at American and Canadian Orthopaedic Trauma meetings, as well as at the Texas Orthopaedic Association annual meeting.

Benjamin M. Petre, M.D.

Dr. Petre graduated from Colgate University, where he earned a degree in biology and spent a semester studying at the National Institutes of Health. Following his undergraduate training, Dr. Petre performed biophysics research in the Department of Cellular Biology at Harvard Medical School.

He attended medical school at University of Rochester School of Medicine and Dentistry, and then went on to complete his internship and residency at Johns Hopkins Hospital. While at Hopkins, Dr. Petre was selected as the administrative chief resident by his faculty and peers, and was also honored by the *Journal of Orthopaedic Trauma* as the "Best Orthopaedic Teaching Resident" in 2009. His research has been broad, including geriatric outcomes, the biomechanics of triceps tears, and microprocessor applications in orthopaedics.

Foot and Ankle Fellow

Norman E. Waldrop, III, M.D.

Originally from Mobile, Alabama, Dr. Waldrop earned his Bachelor of Arts degree in chemistry from the University of Virginia. Following graduation, he returned to Alabama, where he earned his medical degree from the University of Alabama School of Medicine in Birmingham. He completed his residency in Orthopaedic Surgery at Carolinas Medical Center in Charlotte, North Carolina. Dr. Waldrop's research interests include damage control orthopaedics, as well as applications and complications of circular thin wire external fixation frames used in foot and ankle surgery. He has presented research at the AAOS, OTA, and AOFAS national meetings. His other research interests include sports-related injuries of the foot and ankle. After completing his fellowship at the Steadman Clinic under Dr. Clanton, he will return to Birmingham, Alabama, where he will join Andrews Sports Medicine and Orthopaedic Center.

Thank you

A special thank you to our sponsors who make the Fellowship program possible. We'd like to recognize those individuals and foundations that support the entire Fellowship class through the sponsorship of Academic Chairs.

Chair sponsors of the 2011-2012 Steadman-Philippon Fellowship Class are **Mr. and Mrs. Lawrence Flinn, Mr. and Mrs. Brian P. Simmons, Mr. and Mrs. Peter Kellogg, Mr. and Mrs. Al Perkins,** and **Mr. and Mrs. Steven Read.**

Fellowship Benefactors fund the research of one Fellow for one year. Each benefactor is assigned a Fellow who provides written reports and updates of his or her work. We extend our gratitude to the following individuals and foundation for their generous support: **Mr. and Mrs. Milledge Hart, the Fred and Elli Iselin Foundation, Mr. and Mrs. S. Robert Levine, Mr. Tim McAdam, Mr. and Mrs. Jay Precourt,** and **Mr. and Mrs. Stewart Turley.**



Front row from left to right: Thomas O. Clanton, M.D., Benjamin M. Petre, M.D., Mark R. Geyer, M.D., Robert E. Boykin, M.D., B. Christian Balldin, M.D., Jeffrey R. Padalecki, M.D., Adam W. Anz, M.D., Peter J. Millett, M.D., M.Sc. Back row from left to right: J. Richard Steadman, M.D., Norman E. Waldrop, M.D., Marc J. Philippon, M.D., Randy W. Viola, M.D., Robert F. LaPrade, M.D., Ph.D., Eric K. Fitzcharles, M.D.

Sports Medicine Imaging Fellow

Eric K. Fitzcharles, M.D.

Dr. Fitzcharles is a graduate of the University of Kansas, having earned a Bachelor of Science degree in chemical engineering, with highest distinction, in 1988. He competed on the Kansas Crew rowing team during college. Following two years of work as a consulting engineer in Washington, D.C., he attended medical school at the University of Virginia, graduating in 1994, and completed his diagnos-

tic radiology residency at the University of Iowa in 1998. Following residency, Dr. Fitzcharles worked in a Lexington, Kentucky, private practice for nine years as an outpatient radiologist specializing in MRI, PET-CT, and the other cross-sectional imaging modalities. Four years ago, he founded Lexington Radiology, PLLC, a consulting office-based and teleradiology business with clients from around the country. He is a voluntary faculty member in the Department of Neurology at the University of Kentucky.

Where Are They Now. . . ?

The graduating class of 2010-2011 Steadman Philippon Fellows is busy establishing new careers in orthopaedics.

James Ames, M.D.

Dr. Ames is practicing at the Dartmouth-Hitchcock Medical Center in Hanover, New Hampshire.

Henry Ellis, M.D (see page 51).

In August, Dr. Ellis began a six-month fellowship in pediatric orthopaedics at the Hospital for Sick Children in Toronto. In February, he will settle in Dallas where he will practice, research, and teach at the University of Texas Southwestern.

Trevor Gaskill, M.D.

Dr. Gaskill is practicing at the Bone and Joint Sports Medicine Institute at the Naval Medical Center in Portsmouth, Virginia.

John McDonald, M.D.

Dr. McDonald is setting up practice at the Texas Orthopaedics, Sports, and Rehabilitation Center in Austin.

Douglas Nowak, M.D.

Dr. Nowak has moved to Mukiteo, Washington, and is practicing at the Everett Bone and Joint Clinic.

Paul Rath, M.D.

Dr. Rath is now in Tyler, Texas, practicing sports medicine at Mother Francis Hospital Trinity Clinic.

Cliff Willimon, M.D.

Dr. Willimon is establishing his sports medicine practice at Children’s Orthopaedics of Atlanta.

Dr. Henry Ellis Prepares for a Future in Pediatric and Adolescent Sports Medicine

By Jim Brown, Executive Editor, *SPRI News*

"The number of sports injuries among pediatric and adolescent athletes has increased five times in the past ten years," says Dr. Henry Ellis, a member of the 2010-2011 class of Fellows at the Steadman Philippon Research Institute. "This huge increase has resulted in more interest and research into causes, treatment, and prevention of sports injuries."

Dr. Ellis has spent the past decade preparing to make pediatric and adolescent sports medicine the focus of his career. "Over the next five to ten years, we need to develop additional information on injury prevention, especially on the hip," he says, "and I hope to be able to contribute to a better understanding of the problem in that age group."

Off to a Great Start

During his undergraduate studies at the University of Texas, Dr. Ellis spent a summer internship at what was then the Steadman Hawkins Sports Medicine Foundation (now the Steadman Philippon Research Institute). He enjoyed the experience so much that he returned after graduation for a year as a research intern.

Two people have been especially influential regarding Dr. Ellis's decision to become a physician and orthopaedic surgeon. One was his grandfather, Dr. John Ellis, a general practice physician in Sherman, Texas. "He practiced medicine the way it used to be done, making house calls and devoting himself to the entire community."

The other person was Dr. Richard Steadman, founder of the Steadman Clinic and the Research Institute. "My particular interest in sports and sports medicine started during that first internship back in 1997. I spent the summer in the biomechanics lab and learned about treatment, analysis, and how to keep people active. I was also able to talk with Dr. Steadman and learn more about what he and his colleagues were doing at the Clinic and Research Institute. That really motivated me."

Dr. Ellis graduated from the University of Texas Medical School in San Antonio, where he was a member of the Alpha Omega Alpha Honor Medical Society. During his

orthopaedic residency at the University of Texas Southwestern in Dallas, he assisted with sports medicine coverage for high school and college teams. As chief resident, he was honored with teaching and academic awards, including the W. Brandon Carrell Distinguished Physician Award.

"During my training at the Texas Scottish Rite Hospital in Dallas," says Dr. Ellis, "I was really influenced by the number of sports injuries we saw. That exposure also had an effect on my involvement in pediatric sports medicine."

Third Time Around

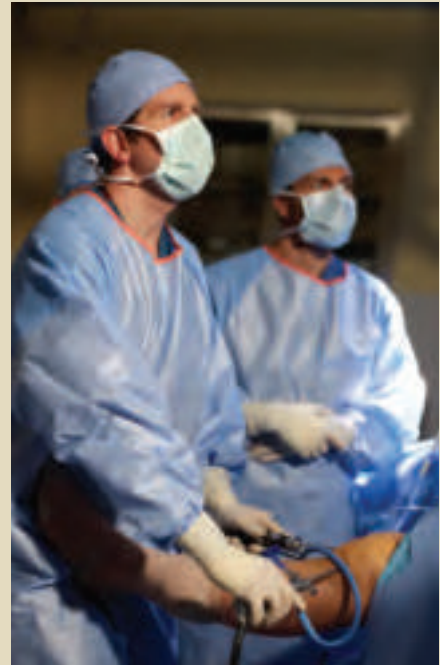
Now he's back at SPRI for a third time. ("Can't get enough," he says.) For the past year he has been a Fellow at SPRI. "I really didn't plan on returning, but once I started looking at sports medicine programs, it was clear to me that this was the best one in the country. It was an easy decision." His research focus at SPRI has been pediatric and adolescent hip arthroscopy.

"There have been tremendous changes in the Foundation/Institute since I first came here. Steadman Philippon has always been a well-known institution, and now it really has an international presence. Orthopaedic surgeons around the world recognize its research excellence and innovation."

"One thing that hasn't changed is the feeling shared by everyone associated with the Research Institute," observes Dr. Ellis. "There has always been a coordinated effort—without self-promotion—among all of the departments. Everyone is trying to determine the best way to keep people on their feet and getting back into physical activity and sports."

One More Stop

Dr. Ellis has one more stop in his preparation for a career in pediatric sports medicine before joining an orthopaedic group in Dallas. In August, he begins a six-month fellowship in pediatric orthopaedics at the Hospital for Sick Children (SickKids) in Toronto. SickKids is recognized as one of the world's foremost pediatric health care institutions.



Henry B. Ellis, Jr., M.D.

When he and his wife, Kacy, and their daughter, Wynn, finally settle in Dallas (once a Texan, always a Texan), he will continue to practice and conduct research, and he will teach interns and fellows at UT Southwestern. Much of his research will be conducted at the Children's Medical Center. It is the only academic healthcare system in Dallas-Fort Worth dedicated solely to the comprehensive care of children from birth to age 18.

Unique Perspective

After serving at three different times and in three different capacities at SPRI, Dr. Ellis has a perspective based on experience. "The Institute is as strong as it has ever been. It keeps progressing, keeps improving, and continues to enhance its role as a world leader in sports medicine."

"The Fellowship program has given me exposure to highly specialized surgical techniques and patient management," he concludes. "More important is Dr. Steadman's philosophy of how to treat patients from the time they walk through the door to the time of their treatment, physical therapy, and recovery are complete. That has been the highlight of my experience at Steadman Philippon."

PRESENTATIONS & PUBLICATIONS



A primary goal of the Institute is to distribute the results of its research. In 2011, principal investigators and Fellows published papers in scientific and medical journals and delivered presentations to a variety of professional and lay audiences worldwide.

Presentations

Anz AW, Millett PJ. Biologics Update. *Rocky Mountain Shoulder Elbow Surgeons Meeting*, Beaver Creek, CO, August 2011.

Carlisle C, Wierks CH, Briggs KK, Philippon MJ. Radiologic Predictors of THR Following Arthroscopy for Femoroacetabular Impingement. Podium Presentation #638. *American Academy of Orthopaedic Surgeons (AAOS) Annual Meeting*, San Diego, CA, February 2011.

Clanton TO. A Historical Perspective on Lateral Reconstruction: Where is the Evidence? What is the Future? *The Steadman Clinic Grand Rounds*, Vail, CO, November 2011.

Clanton TO. Achilles Tendon Injuries. *Arthrex Foot and Ankle Master and Arthroscopy Course*, Vail, CO, February 2011.

Clanton TO. Ankle Arthroscopy: Indications, Set up, Portals and Anterior Decompression. *Arthrex Foot and Ankle Master and Arthroscopy Course*, Vail, CO, February 2011.

Clanton TO. Ankle Instability and Peroneal Tendon Tears: Is There an Arthroscopic Alternative to Open Treatment? *Arthrex Foot and Ankle Master and Arthroscopy Course*, Vail, CO, February 2011.

Clanton TO. Anterior and Posterior Ankle Impingement Syndromes. *2011 Shanghai International Foot and Ankle Surgery Forum*, Shanghai, China, September 2011.

Clanton TO. Arthroscopic Approaches to Foot and Ankle Trauma and Reconstruction. *VuMedi CME Webinar*, Vail, CO, August 2011.

Clanton TO. Arthroscopy in Fracture Management. *2011 Shanghai International Foot and Ankle Surgery Forum*, Shanghai, China, September 2011.

Clanton TO. Back to Basics: The Lateral Collateral Ligaments of the Ankle. *Instructional Course Lecture. AAOS Annual Meeting*, San Diego, CA, February 2011.

Clanton TO. Common Injuries of the Foot and Ankle. *Friends of the Vail Valley Medical Center*, Edwards, CO, November 2011.

Clanton TO. Deformity Correction for Total Ankle Arthroplasty. *First China National Advanced Course for STAR*, Shanghai, China, September 2011.

Clanton TO. Difficult Sports Injuries of the Foot and Ankle. *Arthrex 2nd North American Foot and Ankle Symposium*, Naples, FL, June 2011.

Clanton TO. Lateral Ankle Instability. *The Steadman Clinic Grand Rounds*, Vail, CO, August 2011.

Clanton TO. Lateral Ankle Ligament Reconstruction. *Arthrex Foot and Ankle Master and Arthroscopy Course*, Vail, CO, February 2011.

Clanton TO. Lateral Ankle Ligament Reconstruction. *Instructional Course Lecture, American Orthopaedic Society for Sports Medicine (AOSSM) Annual Meeting*, San Diego, CA, July 2011.

Clanton TO. MRI & Surgical Correlation of Turf Toe: Hallux MTP Capsular- Ligamentous Sesamoid Complex. *2011 Shanghai International Foot and Ankle Surgery Forum*, Shanghai, China, September 2011.

Clanton TO. Physical Examination of the Foot and Ankle. *Current Issues of MRI in Orthopaedics & Sports Medicine*, San Francisco, CA, August 2011.

Clanton TO. Posterior Ankle and Subtalar Arthroscopy. *AOSSM Exchange Lecturer, American College of Sports Medicine*, Denver, CO, June 2011.

Clanton TO. STAR Technique with Video Presentation. *Arthrex Symposium, American Orthopaedic Foot and Ankle Society Pre-Meeting Course*, Keystone, CO, July 2011.

Clanton TO. Surgical Technique for STAR with Video. *First China National Advanced Course for STAR*, Shanghai, China, September 2011.

Clanton TO. Syndesmosis Injuries in Athletes. *2011 Shanghai International Foot and Ankle Surgery Forum*, Shanghai, China, September 2011.

Clanton TO. Tenodesis Ankle Reconstruction Live Demo. *Arthrex 2nd North American Foot and Ankle Symposium*, Naples, FL, June 2011.

Clanton TO. The History and Current State of Lateral Ankle Ligament Reconstruction. *Research Triangle Park Orthopaedic Society Grand Rounds*, Durham, NC, October 2011.

Clanton TO. Turf Toe Injuries in Athletes. *2011 Shanghai International Foot and Ankle Surgery Forum*, Shanghai, China, September 2011.

Clanton TO. Turf Toe Injuries in Athletes. *Small Bone Innovations STAR Advanced Course*, Vail, CO, July 2011.

Corenman DS. Biomechanics of Spinal Disorders. *The Steadman Clinic Orthopaedics & Spine Lecture Series*, Vail, CO, 2011.

Corenman DS. Common Lumbar Injuries in Sport. *NCSA Colorado-Colorado State Clinic: Elite High School / Collegiate Injury Prevention & Athletic Performance Strategies*, October 2011.

Ejnisman L, Gaskill T, Briggs K, Philippon MJ. Femoroacetabular Impingement Secondary to Pubic Symphysis Dysfunction. Poster. International Society for Hip Arthroscopy, Paris, France, October 2011.

Ejnisman L, Pennock A, Briggs KK, Philippon MJ. Does Femoral Anteversion Play a Role in the Pathomechanics and Subsequent Surgical Treatment of Femoroacetabular Impingement? *30th Arthroscopy Association of North America (AANA) Annual Meeting*, San Francisco, CA, April 2011.

Ejnisman L, Pennock A, Briggs KK, Philippon MJ. Does Femoral Anteversion Play A Role In The Pathomechanics And Subsequent Surgical Treatment Of Femoroacetabular Impingement? Paper Presentation. *8th Biennial International Society of Arthroscopy, Knee Surgery and Orthopedic Sports Medicine (ISAKOS) Congress*, Rio de Janeiro, Brazil, May 2011.

Geeslin AG, Jansson KS, Wijdicks CA, Chapman MA, Fok AS, LaPrade RF. Tibial Tunnel Aperture Irregularity After Drilling With 5 Reamer Designs: a Qualitative Micro-CT Analysis. *8th Biennial ISAKOS Congress, Rio de Janeiro, Brazil, May 2011.*

Giphart JE, Shelburne KB, Duffy P, Krong JP, Peterson DS, Hageman E, North A, Torry MR, Hackett TR. Effect of Clavicle Shortening on In Vivo Shoulder Rotations During Abduction Using Biplane Fluoroscopy. *57th Annual Meeting of the Orthopedic Research Society (ORS)*, Long Beach, CA, January 2011.

Hackett TR. Effect of Clavicle Shortening on In Vivo Shoulder Rotation During Abduction and the Latissimus Pulldown Using Biplane Fluoroscopy. *Kerlan Jobe Alumni Research Meeting, AOSSM Annual Meeting*, San Diego, CA, July 2011.

Hackett, TR. An Orthopaedic Surgeon's Perspective on the Olympic Games. *Keystone Science School*, Keystone, CO, 2011.

Hackett, TR. Distal Biceps Management. *Vail Orthopaedic Course*, Vail, CO, 2011.

Hackett, TR. Bicep Tenodesis A Novel Technique. *Howard Head Symposium*, Vail, CO, November 2011.

Hackett, TR. Current Trends in Clavicle Fracture Management. *Vail Emergency Physicians Meeting*, Vail, CO, November 2011.

Hackett, TR. Effect of Clavicle Shortening on In Vivo Shoulder Rotation During Abduction and the Latissimus Pulldown Using Biplane Fluoroscopy. *Howard Head Symposium*, Vail, CO, November 2011.

Hackett, TR. Grade IV cartilage lesions; what the evidence tells us. *AANA Fall Meeting*, Scottsdale, AZ, 2011.

Hackett, TR. AC Joint Dislocations. *Surgical Skills Masters Shoulder Course*, Scottsdale, AZ, March 2011.

Hackett, TR. AC Joint Dislocations. *Surgical Skills Masters Shoulder Course*, Scottsdale, AZ, October 2011.

Hackett, TR. Advancements in Rotator Cuff and PASTA Repair. *Surgical Skills Masters Shoulder Course*, Scottsdale, AZ, October 2011.

Hackett, TR. Advancements in Rotator Cuff and PASTA. *Surgical Skills Masters Shoulder Course*, Scottsdale, AZ, March 2011.

Hackett, TR. Challenges and Approaches to Complex Clavicle Fractures. *Sonoma Clavicle Symposium*, San Diego, CA, May 2011.

Hackett, TR. HTO indications, technique and outcomes. *Vail Orthopaedic Course*, Vail, CO, 2011.

Hackett, TR. Live Surgical Demonstration. *North American Sports Medicine Symposium*, Tracy, CA, January 2011.

Hackett, TR. Live Surgical Instruction, Shoulder. *AANA Fall Meeting*, Scottsdale, AZ, 2011.

Hackett, TR. Meniscal repair options. *Vail Orthopaedic Course*, Vail, CO, 2011.

Hackett, TR. Microfracture in 2011: The Steadman-Hawkins Technique. *AANA Fall Meeting*, Scottsdale, AZ, 2011.

Hackett, TR. MultiDirectional Instability. *Surgical Skills Masters Shoulder Course*, Scottsdale, AZ, March 2011.

Hackett, TR. Percutaneous SLAP Repair. *North American Sports Medicine Symposium*, Tracy, CA, January 2011.

Hackett, TR. Results of Open Reduction and Internal Fixation of Mason Type II and III Radial Head Fractures. *66th Annual Meeting of the American Society for Surgery of the Hand*, Las Vegas, NV, September 2011.

Hackett, TR. Shoulder and Elbow Symposium: UCL Reconstruction West Coast Way. *American Osteopathic Academy of Orthopedics*, Scottsdale, AZ, May 2011.

Hackett, TR. SLAP repair techniques. *Vail Orthopaedic Course*, Vail, CO, 2011.

Hackett, TR. The Athletes Elbow. *Steadman Philippon Research Institute Orthopaedic and Spine Lecture Series*, Vail, CO, June 2011.

Hackett, TR. Multi Directional Instability. *Surgical Skills Masters Shoulder Course*, Scottsdale, AZ, October 2011.

Hackett, TR. UCL Injuries and Repairs. *North American Sports Medicine Symposium*, Tracy, CA, January 2011.

Hanson C, Heuer HJD, Millett PJ. Return to Sport Following Intramedullary Fixation of Midshaft Clavicle Fractures. Poster. *124th Annual Meeting of the American Orthopaedic Association*, Boston, MA, June 2011.

Hanson C, Schoenahl JY, Millett PJ.

Axillary Nerve Compression in Glenohumeral Osteoarthritis: Correlation Between Osteophyte Size and Teres Minor Fatty Infiltration. E-Poster #268. *AANA Annual Meeting*, San Francisco, CA, April 2011.

Herzog M, McDonald J, Philippon, MJ.

Outcomes Following Hip Arthroscopy in Patients with Type Three Ehlers-Danlos. Poster. *International Society for Hip Arthroscopy*, Paris, France, October 2011.

LaPrade RF. Combined ACL/PCL/PLC/Multiligament Repair. *Arthrex Surgical Skills Roadshow*, Vail, CO, March 2011.

LaPrade RF. Meniscal Allograft. *Arthrex Surgical Skills Roadshow*, Vail, CO, March 2011.

LaPrade RF. Meniscus Transplantation: Indications and Techniques. *AAOS/AOSSM Sports Medicine Course*, Vail, CO, March 2011.

LaPrade RF. Posterolateral Corner: Repair, Reconstruction, and Outcomes. *AAOS/AOSSM Sports Medicine Course*, Vail, CO, March 2011.

LaPrade RF. Superficial MCL and Posteromedial Injury: Don't Confuse with a Posterolateral Knee Injury. *AAOS/AOSSM Sports Medicine Course*, Vail, CO, March 2011.

LaPrade RF. A New Technique for MCL Reconstruction. *Emerging Techniques in Orthopedics Lecture Faculty*, Las Vegas, NV, December 2011.

LaPrade RF. A Simple Reproducible Technique for Posterolateral Corner Reconstruction. *Emerging Techniques in Orthopedics Lecture Faculty*, Las Vegas, NV, December 2011.

LaPrade RF. Allograft Transplants. *Arthrex Surgical Skills*, Vail, CO, March 2011.

LaPrade RF. Anatomic Posterolateral Reconstruction of the Knee. *ISAKOS Pre-Congress Course*, Rio de Janeiro, Brazil, May 2011.

LaPrade RF. Anatomy and Diagnosis of Posterolateral Knee Injuries. *Jishuitan Sports Medicine Summit*, Beijing, China, June 2011.

LaPrade RF. Avoiding Collateral Damage: Identifying and Treating MCL and FCL (PLC) Injuries of the Knee. *American College of Sports Medicine (ACSM)*, Denver, CO, June 2011.

LaPrade RF. Case Presentations and Panel Discussion: Ligament Reconstruction. *AANA Specialty Day, AAOS Annual Meeting*, San Diego, CA, February 2011.

LaPrade RF. Clinically Relevant Anatomy and Diagnostic Techniques for Posterolateral Knee Injuries. *8th Biennial ISAKOS Congress*, Rio de Janeiro, Brazil, May 2011.

LaPrade RF. Combined ACL/PCL and PLC Reconstruction. *Arthrex, Surgical Skills*, Vail, CO, March 2011.

LaPrade RF. Examination of the Athletic Knee. *Howard Head Sports Medicine Physical Therapists*, Vail, CO, April 2011.

LaPrade RF. Instructional Course: Combined ACL, PCL and Posterolateral Injuries Reconstruction. *South African Orthopaedic Congress*, Sun City, South Africa, September 2011.

LaPrade RF. Instructional Course: Quantitative and Qualitative Anatomy of the ACL, PCL, PLC and Medial Knee. *South African Orthopaedic Congress*, Sun City, South Africa, September 2011.

LaPrade RF. Instructional Course: Surgical Treatment of Acute and Chronic Medial Knee Injuries. *South African Orthopaedic Congress*, Sun City, South Africa, September 2011.

LaPrade RF. Instructional Course: The Use of Stress Radiographs and MRI Scans in Multiple Ligament Knee Injuries. *South African Orthopaedic Congress*, Sun City, South Africa, September 2011.

LaPrade RF. Keynote Lecture: Arthroscopic Posterior Capsule Release for Post-Surgical Flexion Deformity after Multiple Ligament Reconstruction. *South African Orthopaedic Congress*, Sun City, South Africa, September 2011.

LaPrade RF. Keynote Lecture: The Treatment of Acute and Chronic Posterolateral Knee Injuries. *South African Orthopaedic Congress*, Sun City, South Africa, September 2011.

LaPrade RF. Management of the Medial Side of the Knee with or without ACL Injury. *ISAKOS Pre-Congress Course*, Rio de Janeiro, Brazil, May 2011.

LaPrade RF. Medial Injuries: Anatomic Rational and Algorithm for Treatment: Acute and Chronic Injuries. *University of Warwick, England Sports Knee Surgery*, Warwick, England, November 2011.

LaPrade RF. Osteotomies Around the Knee. *AAOS/AOSSM Sports Medicine Course*, Vail, CO, March 2011.

LaPrade RF. PCL and PLC Reconstruction. *ISAKOS Sports Rehabilitation Course: Global Perspectives for the Physical Therapist and Athletic Trainer*, Rio de Janeiro, Brazil, May 2011.

LaPrade RF. Posterolateral Corner Reconstruction. *VuMedi CME Webinar Logistics*, November 2011.

LaPrade RF. Posterolateral Corner: Repair, Reconstruction, and Outcomes. *Colorado University School of Medicine Fall Symposium*, Aurora, CO, September 2011.

LaPrade RF. Practical Management of Posterolateral Instability. *AANA Fall Course Lecture Faculty*. Palm Desert, CA, November 2011.

LaPrade RF. Qualitative and Quantitative Anatomy of the ACL. *Sports Knee Surgery Conference, University of Warwick, England Sports Knee Surgery*, Warwick, England, November 2011.

LaPrade RF. Sports Medicine/Arthroscopy I: Articular Cartilage Clinical and Research. *AAOS Annual Meeting*, San Diego, CA, February 2011.

LaPrade RF. Spotlight Technique Video: Posterolateral Corner Reconstruction. *AANA Specialty Day, AAOS Annual Meeting*, San Diego, CA, February 2011.

LaPrade RF. Superficial MCL and Posteromedial Injury: Don't Confuse with a Posterolateral Knee Injury. *Colorado University School of Medicine Fall Symposium*, Aurora, CO, September 2011.

LaPrade RF. Treatment of Acute Posterolateral Corner Injuries. *Jishuitan Sports Medicine Summit*, Beijing, China, June 2011.

LaPrade RF. Treatment of Chronic Posterolateral Knee Injuries. *Jishuitan Sports Medicine Summit*, Beijing, China, June 2011.

LaPrade RF. Treatment of Posterolateral Corner Injuries. *University of Warwick, England Sports Knee Surgery*, Warwick, England, November 2011.

Leake M, Millett PJ, Schoenahl JY, Register B, Gaskill TR, van Deurzen DFP, West A. Anatomic Reconstruction of Posterior Glenoid Deficiency Using Distal Tibial Osteoarticular Allograft in the Treatment of Recurrent Posterior Shoulder Instability: A Case Series. *2011 National Athletic Trainers' Association (NATA) Annual Meeting & Clinical Symposia*, New Orleans, LA, June 2011.

Lertwanich P, Ejnisman L, Briggs K, Philippon MJ. Relationship between the Presence of a Rim Fragment and Intra-Articular Pathology in Patients with Femoroacetabular Impingement. Paper Presentation. *8th Biennial ISAKOS Congress*, Rio de Janeiro, Brazil, May 2011.

Lertwanich P, Ejnisman L, Giphart JE, Philippon MJ. Acetabular Rim Anatomy for Suture Anchor Insertion Determined by Three-Dimensional Computed Tomography. *8th Biennial ISAKOS Congress*, Rio de Janeiro, Brazil, May 2011.

Lertwanich P, Ejnisman L, Torry MR, Giphart JE, Philippon MJ. Acetabular Rim Anatomy For Suture Anchor Insertion Determined By Three-Dimensional Computed Tomography. Paper Presentation. *8th Biennial ISAKOS Congress*, Rio de Janeiro, Brazil, May 2011.

Matsuda DK, Carlisle JC, Arthurs SC, Wierks CH, Philippon MJ. Comparative Systematic Review of Open Dislocation, Mini-Open, and Arthroscopic Surgery for Femoroacetabular Impingement. Paper Presentation. *8th Biennial ISAKOS Congress*, Rio de Janeiro, Brazil, May 2011.

McIntire M, Sterett W, Steadman JR, Wijdicks CA, Pennington W, Guillet A. Effect of Noninvasive Devices on Knee Mechanical Axis Alignment and Symptomatic Ratings for Alpine Skiers. *International Society for Skiing Safety*, Keystone, CO, 2011.

Millett PJ, Schoenahl JY, Allen MJ, Gaskill TR. Inferior humeral osteophytes as a novel cause of axillary neuropathy and teres minor fatty infiltration in GHOA. Poster #45. *American Shoulder and Elbow Surgeons Closed Meeting*, Sea Island, GA, October 2011.

Millett PJ. AC & SC Injuries, Glenoid, and Scapula Fractures: AC Joint Injuries and Treatment. *AAOS ICL*, San Diego, CA, February 2011.

Millett PJ. AC Joint Dislocations. *Arthrex Surgical Skills Knee and Shoulder Roadshow Faculty*, Boston, MA, June 2011.

Millett PJ. AC Joint Technique for CC Ligament Reconstruction. *12th Annual AAOS/AOSSM Sports Medicine Course: Elite Athletes to Weekend Warriors*, Vail, CO, March 2011.

Millett PJ. Acute Dislocation: Is There a Place for Arthroscopic Treatment? *2011 NATA Annual Meeting & Clinical Symposia*, New Orleans, LA, June 2011.

Millett PJ. Advancements in Rotator Cuff Repair. *Arthrex Surgical Skills Knee and Shoulder Roadshow Faculty*, Boston, MA, June 2011.

Millett PJ. Bone Loss in Shoulder Instability- What to do and how to do it? *Taos Orthopaedic Institute*, Taos, NM, April 2011.

Millett PJ. Bony Deformity Management in Anterior Instability: The Engaging Hill-Sachs Deformity. *12th Annual AAOS/AOSSM Sports Medicine Course: Elite Athletes to Weekend Warriors*, Vail, CO, March 2011.

Millett PJ. Career Advice for the Orthopaedic Fellow- How to Start Your Sports Medicine Practice. *Taos Orthopaedic Institute*, Taos, NM, April 2011.

Millett PJ. Case Presentation. *Arthrex Surgical Skills Knee and Shoulder Roadshow Faculty*, Boston, MA, June 2011.

Millett PJ. Common Shoulder Injuries in Skiers and Snowboarders. *SPRI Spine Series*, Vail, CO, March 2011.

Millett PJ. Distal Biceps Tendon Rupture: Single-Incision Technique for Repair and Results. *12th Annual AAOS/AOSSM Sports Medicine Course: Elite Athletes to Weekend Warriors*, Vail, CO, March 2011.

Millett PJ. ICL 202: Subcoracoid Impingement and Coracoplasty. *AANA Annual Meeting*, San Francisco, CA, April 2011.

Millett PJ. ICL 301: Revision Shoulder Surgery: Tips and Techniques to Manage Failed RC Repairs, Stabilizations and SLAP Repairs. *AANA Annual Meeting*, San Francisco, CA, April 2011.

Millett PJ. Massive Cuff Repairs with Augmentation/Bridging. *Arthrex North American Sports Medicine Symposium*, Tracy, CA, January 2011.

Millett PJ. Normal Variants of Shoulder Arthroscopy. *12th Annual AAOS/AOSSM Sports Medicine Course: Elite Athletes to Weekend Warriors*, Vail, CO, March 2011.

Millett PJ. Partial Cuff Tears and PASTA Lesion. *12th Annual AAOS/AOSSM Sports Medicine Course: Elite Athletes to Weekend Warriors*, Vail, CO, March 2011.

Millett PJ. Point-Counterpoint: The Engaging Hill-Sach's Lesion – Bone Grafting. *12th Annual AAOS/AOSSM Sports Medicine Course: Elite Athletes to Weekend Warriors*, Vail, CO, March 2011.

Millett PJ. Rotator Cuff Mastery: Positioning and Portals. *AAOS ICL*, San Diego, CA, February 2011.

Millett PJ. Rotator Cuff Repairs – Management of Massive and Irreparable Tears. *Taos Orthopaedic Institute*, Taos, NM, April 2011.

Millett PJ. Staying in the Game for Life: Sports and Sports Medicine & Their Effects on Our Children. *Berry Creek Middle School*, Edwards, CO, April 2011.

Millett PJ. STOP Sports Injuries! *Berry Creek Middle School*, Edwards, CO, May 2011.

Millett PJ. Surgical Anatomy of 10 Common Upper Extremity Conditions: A Refresher for the General Orthopaedic Surgeon. *AAOS ICL*, San Diego, CA, February 2011.

Millett PJ. Technical Pearls for the Latarjet Procedure. *Taos Orthopaedic Institute*, Taos, NM, April 2011.

Millett PJ. Technique for Arthroscopic Biceps Tenodesis. *12th Annual AAOS/AOSSM Sports Medicine Course: Elite Athletes to Weekend Warriors*, Vail, CO, March 2011.

Millett PJ. Total Shoulder Arthroplasty. *Arthrex Surgical Skills Knee and Shoulder Roadshow Faculty*, Boston, MA, June 2011.

Millett PJ. Wet Lab Biceps, AC joint, Latarjet, Unifers II. *Arthrex Surgical Skills Knee and Shoulder Roadshow Faculty*, Boston, MA, June 2011.

Millett PJ. Wet Lab Rotator Cuff and Instability. *Arthrex Surgical Skills Knee and Shoulder Roadshow Faculty*, Boston, MA, June 2011.

Millett PJ. Acute 3rd Degree AC Separations Should be Treated Arthroscopically. *AANA Fall Course*, Palm Desert, CA, November 2011.

Millett PJ. Arthroflex SpeedBridge with Augmentation, Live Surgical Demonstration. *Arthrex North American Sports Medicine Symposium*, Tracy, CA, January 2011.

Millett PJ. Arthroscopic Linked Double Row Repair. *Cowboy Way Meeting San Antonio on Arthrex Cadaver Course*, San Antonio, TX, October 2011.

Millett PJ. Best Practices in the Treatment of the Athletic Shoulder. *Howard Head 1st Annual Sports Medicine Symposium*, Vail, CO, September 2011.

Millett PJ. Biomechanics and Current Techniques in RCR. *Arthrex 2011 Fellowship Forum*, Naples, FL, June 2011.

Millett PJ. Common Shoulder Issues and Assessment. *SPRI ATC Educational Meeting*, Vail CO, October 2011.

Millett PJ. Failed SLAP repairs: How it Happens/How to Fix Them. *Rocky Mountain Shoulder Elbow Surgeons Meeting*, Beaver Creek, CO, August 2011.

Millett PJ. How I Repair Anterior Instability. *Cowboy Way Meeting San Antonio on Arthrex Cadaver Course*, San Antonio, TX, October 2011.

Millett PJ. Humeral Fractures (Percutaneous Pinning, Sutureplate, Unifers Fracture Stem). *Arthrex 2011 Fellowship Forum*, Naples, FL, June 2011.

Millett PJ. Humeral Fractures (Percutaneous Pinning, Sutureplate, Unifers Fracture Stem). Wet Lab: Shoulder. *Arthrex 2011 Fellowship Forum*, Naples, FL, June 2011.

Millett PJ. Instructor. Case Presentation: Instability. *Arthrex Surgical Skills Knee and Shoulder Roadshow*, Salt Lake City, UT, February 2011.

Millett PJ. Instructor. Pearls for Subscapularis Repair. *Arthrex Surgical Skills Knee and Shoulder Roadshow*, Salt Lake City, UT, February 2011.

Millett PJ. Instructor. Total Shoulder Arthroplasty (Unifers II/Eclipse). *Arthrex Surgical Skills Knee and Shoulder Roadshow*, Salt Lake City, UT, February 2011.

Millett PJ. Instructor. Wet lab: Biceps, AC joint, Latarjet, Unifers II, Eclipse. *Arthrex Surgical Skills Knee and Shoulder Roadshow*, Salt Lake City, UT, February 2011.

Millett PJ. Instructor. Wet lab: Rotator Cuff and Instability. *Arthrex Surgical Skills Knee and Shoulder Roadshow*, Salt Lake City, UT, February 2011.

Millett PJ. Lassos, Fiberwire, GlenoidSwivelock. *Arthrex 2011 Fellowship Forum*, Dallas, TX, September 2011.

Millett PJ. Managing Bone Loss (Latarjet). *Arthrex 2011 Fellowship Forum*, Naples, FL, June 2011.

Millett PJ. Managing Bone Loss (Latarjet). Wet Lab: Shoulder. *Arthrex 2011 Fellowship Forum*, Naples, FL, June 2011.

Millett PJ. Point Counter-Point Latissimus Transfers. *Rocky Mountain Shoulder Elbow Surgeons Meeting*, Beaver Creek, CO, August 2011.

Millett PJ. Proximal Humeral Fracture. *Arthrex North American Sports Medicine Symposium*, Tracy, CA, January 2011.

Millett PJ. Rotator Cuff Repair Simultaneous Live Surgical Demonstrations. *Arthrex 2011 Fellowship Forum*, Naples, FL, June 2011.

Millett PJ. Shoulder Web lab. *AANA Fall Course*, Palm Desert, CA, November 2011.

Millett PJ. Shoulder: AC/SC/Nerves/ Fractures. *AOSSM & AAOS Review Course for Subspecialty Certification in Ortho Sports Medicine*, Chicago, IL, August 2011.

Millett PJ. Staying in the game for life. *Vail Symposium Health & Wellness series*, Vail, CO, September 2011.

Millett PJ. Surgeon Testimonial: Why Double Row is the Standard of Care. *Arthrex 2011 Fellowship Forum*, Dallas, TX, September 2011.

Millett PJ. Swivelock, Arthroflex, Fastpass, Fibertape, Passport. *Arthrex 2011 Fellowship Forum*, Dallas, TX, September 2011.

Myers C, Torry MR, Peterson DS, Shelburne KB, Krong JP, Giphart JE, Steadman JR, Woo SLY. Comparison of Two Data Normalization Schemes for Knee Kinematics Derived from Bi-Plane Fluoroscopy. *57th Annual Meeting of the ORS*, Long Beach, CA, January 2011.

Myers CA, Torry MR, Shelburne KB, Pennington WW, Krong JP, Giphart JE, Woo, SLY, Steadman JR. Tibiofemoral Kinematics During Four Functional Task of Increasing Demand Using Biplane Fluoroscopy. *8th Biennial ISAKOS Congress*, Rio de Janeiro, Brazil, May 2011.

Myers CA, Giphart JE, Torry MR, Shelburne KB, Woo SLY, Steadman JR. The Relationship Between Indicators of "High Risk" Landing Mechanics and Knee Translations in Female Athletes. *International Olympic Committee (IOC) World Conference on Prevention of Injury & Illness in Sport*, Monte-Carlo, Monaco, April 2011.

Myers CA, Giphart JE, Torry MR, Shelburne KB, Woo SLY, Steadman JR. The Relationship of Lower Extremity Alignments and Anterior Knee Laxity to Knee Translations During a Vertical Drop Landing. *IOC World Conference on Prevention of Injury & Illness in Sport*, Monte Carlo, Monaco, April 2011.

Myers CA, Torry MR, Shelburne KB, Pennington WW, Krong JP, Giphart JE, Woo SLY, Steadman JR. Anterior Tibial Translation as a Function of Knee Flexion Angle During Maximum Isometric Quadriceps Contraction Using Biplane Fluoroscopy. *57th Annual Meeting of the ORS*, Long Beach, CA, January 2011.

Nowak D, Briggs K, Philippon MJ. Predictors of Grade IV Cartilage Lesions in the Hip. Poster. *30th AANA Annual Meeting*, San Francisco, CA, April 2011.

Pennington W, Myers C, Register B, Lertwanich P, Ejnisman L, Giphart J, Torry M, Philippon M. Contributions of the Iliofemoral Ligament and the Acetabular Labrum in Hip Stability. Poster. *57th Annual Meeting of the ORS*, Long Beach, CA, January 2011.

Pennington W, Myers C, Register B, Lertwanich P, Ejnisman L, Giphart J, Torry M, Philippon M. Contributions of the Iliofemoral Ligaments and the Acetabular Labrum in Hip Stability. Paper Presentation. *8th Biennial ISAKOS Congress*, Rio de Janeiro, Brazil, May 2011.

Pennington W, Myers C, Register B, Lertwanich P, Ejnisman L, Giphart J, Torry M, Philippon M. Contributions of the Iliofemoral Ligament and the Acetabular Labrum in Limiting Hip External Rotation. Poster. *AOSSM Annual Meeting*, San Diego, CA, July 2011.

Pennington WW, Myers CA, Register BC, Lertwanich P, Ejnisman L, Giphart JE, Torry MR, Philippon MJ. Contributions of the Iliofemoral Ligament and the Acetabular Labrum in Hip Stability. *57th Annual Meeting of the ORS*, Long Beach, CA, January 2011.

Philippon M, LaPrade R, Briggs K, Stull J. Association of Strength and Range of Motion with Alpha Angles in Elite Youth Hockey Players. Poster #164. *IOC World Conference on Prevention of Injury & Illness in Sport*, Monte Carlo, Monaco, April 2011.

Philippon M, LaPrade R, Briggs K, Stull J. Clinical Examination with MRI Validation to Assess High Hip Alpha Angle: A Prospective Study among Asymptomatic Elite Youth and Pre-Collegiate Ice Hockey Players. Poster. *AOSSM Annual Meeting*, San Diego, CA, July 2011.

Philippon M, LaPrade R, Briggs K, Stull J. Screening of Asymptomatic Elite Youth Hockey Players: Clinical and MRI Exam. *IOC World Conference on Prevention of Injury & Illness in Sport*, Monte Carlo, Monaco, April 2011.

Philippon M, Stull J, LaPrade R. 'At Risk' Positioning and Hip Biomechanics of the Pee wee Ice Hockey Sprint Start. Poster #165. *IOC World Conference on Prevention of Injury & Illness in Sport*, Monte Carlo, Monaco, April 2011.

Philippon MJ, Briggs KK. Are Years of Sport Participation Associated with Femoroacetabular Impingement? Poster. *30th AANA Annual Meeting*, San Francisco, CA, April 2011.

Philippon MJ, Briggs KK. Are Years of Sport Participation Associated with Femoroacetabular Impingement? E-Poster. *8th Biennial ISAKOS Congress*, Rio de Janeiro, Brazil, May 2011.

Philippon MJ, Briggs KK. Does Femoral Anteversion Play a Role in the Pathomechanics and Subsequent Surgical Treatment of Femoroacetabular Impingement? *30th AANA Annual Meeting*, San Francisco, CA, April 2011.

Philippon MJ, Briggs KK. Return to Play Following Arthroscopic Microfracture of the Hip in Elite Athletes. *30th AANA Annual Meeting*, San Francisco, CA, April 2011.

Philippon MJ, Ejnisman L, Briggs KK. Clinical Outcomes after Hip Arthroscopy in Soccer Players. E-Poster. *8th Biennial ISAKOS Congress*, Rio de Janeiro, Brazil, May 2011.

Philippon MJ, Ellis H, Ejnisman L, Briggs KK. Outcomes Following Hip Arthroscopy in the Youth Athlete. Paper Presentation. *8th Biennial ISAKOS Congress*, Rio de Janeiro, Brazil, May 2011.

Philippon MJ, Ellis H, Ejnisman L, Briggs KK. Clinical Outcomes Following Hip Arthroscopy for Femoroacetabular Impingement in Adolescents. *30th AANA Annual Meeting*, San Francisco, CA, April 2011.

Philippon MJ, Ellis H, Ejnisman L, Briggs KK. Outcomes Following Treatment for FAI and Labral Tears in the Adolescent. Podium Presentation #552. *AAOS Annual Meeting*, San Diego, CA, February 2011.

Philippon MJ, Herzog M, McDonald J. Return to Play Following Arthroscopic Microfracture of the Hip in Elite Athletes. *30th AANA Annual Meeting*, San Francisco, CA, April 2011.

Philippon MJ, LaPrade RF, Briggs KB, Pierce CM, Stull JD. Prevalence of acetabular labral tears in asymptomatic young athletic subjects. A prospective investigation using magnetic resonance imaging (MRI). *AOSSM 2012 Annual Meeting*, Baltimore, MD, July 2012.

Philippon MJ, McDonald J, Herzog M. Performance Levels in Professional Hockey Players Following Arthroscopic Microfracture Surgery in the Hip. Paper Presentation. *AOSSM Annual Meeting*, San Diego, CA, July 2011.

Philippon MJ, Myers CA, Pennington WW, Lertwanich P, Ejnisman L, Giphart JE, Register BC. Contributions of the Iliofemoral Ligaments and Acetabular Labrum in Hip Stability. *8th Biennial ISAKOS Congress*, Rio de Janeiro, Brazil, May 2011.

Philippon MJ, Nogueira B, France A, Briggs KK. Hip Arthroscopy in Professional Tennis Players: Pathologies and Return to Play. Poster. *International Society for Hip Arthroscopy*, Paris, France, October 2011.

Philippon MJ, Register B, Pennock A, Ho C, Briggs KK. Prevalence of Abnormal Hip Findings in Asymptomatic Subjects: A Prospective Blinded Study. *International Society for Hip Arthroscopy*, Paris, France, October 2011.

Philippon MJ. Labral Reconstruction. Technique Focus Video. *AANA Annual Meeting*, Palm Springs, CA, November 2011.

Philippon MJ. Labral Refixation: Current Techniques & Indications. *9th Symposium on Joint Preserving and Minimally Invasive Surgery of the Hip*, New York, NY, June 2011.

Philippon MJ. Advanced Reconstructive Procedures (Labrum and Ligamentum Teres). Course 103: Advanced Hip Arthroscopy: Labral Disorders, Femoroacetabular Impingement, and Extra-Articular Disorders. *30th AANA Annual Meeting*, San Francisco, CA, April 2011.

Philippon MJ. Advancements in Arthroscopic Hip Labral Repair. Smith & Nephew Booth Presentation. *AAOS Annual Meeting*, San Diego, CA, February 2011.

Philippon MJ. Advances in Hip Arthroscopy. *Annual Cappagh Trust Meeting, Cappagh National Orthopaedic Hospital*, Dublin, Ireland, September 2011.

Philippon MJ. Arthroscopic Hip Surgery in Professional Hockey Players. *51st Annual Manitoba Orthopaedic Symposium*, Manitoba, Canada, October 2011.

Philippon MJ. Arthroscopic Labral Repair. Smith & Nephew Booth Hip Workshop. *AOSSM Annual Meeting*, San Diego, CA, July 2011.

Philippon MJ. Arthroscopic Treatment of FAI – surgical technique. Video. *2011 ICJR 3rd Annual Winter Hip & Knee Course*, Vail, CO, January 2011.

Philippon MJ. Ask the EXPERT: Hip. Smith & Nephew Booth Presentation. *8th Biennial ISAKOS Congress*, Rio de Janeiro, Brazil, May 2011.

Philippon MJ. At-Risk Hip Positioning of the Pee Wee Hockey Sprint Start. *51st Annual Manitoba Orthopaedic Symposium*, Manitoba, Canada, October 2011.

Philippon MJ. Case Discussions from Faculty and Participants. *AO North America Symposium on Surgical Preservation of the Hip*, Vail, CO, January 2011.

Philippon MJ. Case Presentations and Panel Discussion. *ANNA Specialty Day, AAOS Annual Meeting*, San Diego, CA, February 2011.

Philippon MJ. Clinical Case Panel #3: All Things Hip. *30th AANA Annual Meeting*, San Francisco, CA, April 2011.

Philippon MJ. Coordinator. Hip Arthroscopy Essentials: How to Effectively Introduce the Techniques into Your Practice. *30th AANA Annual Meeting*, San Francisco, CA, April 2011.

Philippon MJ. Debate: Is it the Labrum or the Bone that is the Problem? *Emerging Techniques in Orthopedics: Sports Medicine and Arthroscopy*, Las Vegas, NV, December 2011.

Philippon MJ. Does Labral Reconstruction Work? *AO North America Symposium on Surgical Preservation of the Hip*, Vail, CO, January 2011.

Philippon MJ. FAI - Overview and Indications for Treatment. *2011 International Congress for Joint Reconstruction 3rd Annual Winter Hip & Knee Course*, Vail, CO, January 2011.

Philippon MJ. FAI –Arthroscopic Treatment. *8th Biennial ISAKOS Congress*, Rio de Janeiro, Brazil, May 2011.

Philippon MJ. FAI in Athletes. *12th World Congress of the Society of Tennis Medicine and Science*, Paris, France, November 2011.

Philippon MJ. FAI in Athletes. *Perugia University Orthopaedics and Traumatology Program*, Arezzo, Italy, November 2011.

Philippon MJ. FAI in the Pediatric Population. *Vail Hip Arthroscopy Symposium*, Vail, CO, March 2011.

Philippon MJ. FAI in the Professional Athletes. *Sanitas International Symposium on Sports Medicine 2011*, Madrid, Spain, October 2011.

Philippon MJ. FAI Outcome in the Elite Athlete. *Vail Hip Arthroscopy Symposium*, Vail, CO, March 2011.

Philippon MJ. FAI: Truth or Fiction – Point-Counterpoint. *International Skeletal Society Annual Meeting*, San Diego, CA, September 2011.

Philippon MJ. Fascia Lata. *International Society for Hip Arthroscopy*, Paris, France, October 2011.

Philippon MJ. Femoroacetabular Impingement in Athletes. *Congresso Nazionale SIA*, Milan, Italy, November 2011.

Philippon MJ. Hands on Workshop. Smith & Nephew Workshop. *AAOS Annual Meeting*, San Diego, CA, February 2011.

Philippon MJ. Hip Arthroscopy in Elite Athletes. *Annual Cappagh Trust Meeting*, Cappagh National Orthopaedic Hospital, Dublin, Ireland, September 2011.

Philippon MJ. Hip Arthroscopy in the Athlete: From Weekend Warrior to Elite Athlete. *Harvard University Sports Medicine Conference*, Boston, MA, September 2011.

Philippon MJ. Hip Arthroscopy in the Athlete: From Weekend Warrior to Elite Athlete. *Yale University Residents Conference*, New Haven, CT, September 2011.

Philippon MJ. Hip Arthroscopy. Mini Fellowship. *AANA Annual Meeting*, Palms Springs, CA, November 2011.

Philippon MJ. Hip Arthroscopy: From Diagnosis to Patient Outcomes. *Harvard University Grand Rounds*, Boston, MA, September 2011.

Philippon MJ. Hip Arthroscopy: From Diagnosis to Patient Outcomes. *Yale University Grand Rounds*, New Haven, CT, September 2011.

Philippon MJ. Hip Arthroscopy: Fundamental Techniques and Foundational Skills. Instructional Course #271. *AAOS Annual Meeting*, San Diego, CA, February 2011.

Philippon MJ. Hip Program Director. *Emerging Techniques in Orthopedics: Sports Medicine and Arthroscopy*, Las Vegas, NV, December 2011.

Philippon MJ. How to Treat FAI Treatment by Arthroscopy: Rim Trim plus Labral Refixation. *AO North America Symposium on Surgical Preservation of the Hip*, Vail, CO, January 2011.

Philippon MJ. Identifying Young Athletes at Risk for Hip Injuries. *51st Annual Manitoba Orthopaedic Symposium*, Manitoba, Canada, October 2011.

Philippon MJ. Iliopsoas Is a Problem When There is Increased Anteversion. *International Society for Hip Arthroscopy*, Paris, France, October 2011.

Philippon MJ. Moderator. ISS Meets ISHA. *International Skeletal Society Annual Meeting*, San Diego, CA, September 2011.

Philippon MJ. Labral Reconstruction: My Long Term Results, When to do it, How to do it, Step by Step. *Emerging Techniques in Orthopedics: Sports Medicine and Arthroscopy*, Las Vegas, NV, December 2011.

Philippon MJ. Labral Repair. Teaching Conference. *My Topic For You: The 3rd International Congress on State of the Art Updates in Orthopedic Trauma and Arthroscopic Surgery*, Ermatingen, Switzerland, October 2011.

Philippon MJ. Labral Surgery: Resection, Repair and Reconstruction. *Symposia: Hip Arthroscopy 2011 – An International Perspective*. *8th Biennial ISAKOS Congress*, Rio de Janeiro, Brazil, May 2011.

Philippon MJ. Live Surgical Demonstration. *Vail Valley Surgery Center. Vail Hip Arthroscopy Symposium*, Vail, CO, March 2011.

Philippon MJ. Live Surgical Demonstration: Labral Grafting/Reconstruction Gluteus Medius Repair. *8th Biennial ISAKOS Congress*, Rio de Janeiro, Brazil, May 2011.

Philippon MJ. ICL #7 Chair. Management of FAI in Athletes: Open vs. Scope. *8th Biennial ISAKOS Congress*, Rio de Janeiro, Brazil, May 2011.

Philippon MJ. Moderator. Miscellaneous Lower Extremity Issues. *12th Annual AAOS/AOSSM Sports Medicine Course: Elite Athletes to Weekend Warriors*, Vail, CO, March 2011.

Philippon MJ. Outcomes Following Hip Arthroscopy in Patients with Hip Dysplasia. *Vail Hip Arthroscopy Symposium*, Vail, CO, March 2011.

Philippon MJ. Panel Discussion and Case Presentations. *12th Annual AAOS/AOSSM Sports Medicine Course: Elite Athletes to Weekend Warriors*, Vail, CO, March 2011.

Philippon MJ. Role of Hip Arthroscopy in Athletes: Tips & Techniques. *12th Annual AAOS/AOSSM Sports Medicine Course: Elite Athletes to Weekend Warriors*, Vail, CO, March 2011.

Philippon MJ. Moderator. Scientific Session: Hip – Femoral Acetabular Impingement. *AOSSM Annual Meeting*, San Diego, CA, July 2011.

Philippon MJ. Surgical Options in FAI: How Imaging Findings Affect My Decisions. *International Skeletal Society Annual Meeting*, San Diego, CA, September 2011.

Philippon MJ. Tennis Player's Labrum Tear – The Arthroscopic Approach. *8th Biennial ISAKOS Congress*, Rio de Janeiro, Brazil, May 2011.

Philippon MJ. The Arthroscopic Treatment of FAI. *International Cartilage Repair Society (ICRS) Focus Meeting: The Hip*, Zurich, Switzerland, June 2011.

Philippon MJ. The Athletes Hip and Groin: Evaluation and Diagnosis. *12th Annual AAOS/AOSSM Sports Medicine Course: Elite Athletes to Weekend Warriors*, Vail, CO, March 2011.

Philippon MJ. Tips for a Successful Hip Arthroscopy Practice. *Course 201: Hip Arthroscopy Essentials: How to Effectively Introduce the Techniques Into Your Practice*. *30th AANA Annual Meeting*, San Francisco, CA, April 2011.

Philippon MJ. Treatment of Traumatic Chondral Injuries and FAI Related Chondral Labral Dysfunction. *Emerging Techniques in Orthopedics: Sports Medicine and Arthroscopy*, Las Vegas, NV, December 2011.

Philippon MJ. Treatment Procedures for the Peripheral Compartment. *Congresso Nazionale SIA*, Milan, Italy, November 2011.

Philippon MJ. Use of PRP in the Olympic and Professional Athlete. *Vail Hip Arthroscopy Symposium*, Vail, CO, March 2011.

Rodeky WG. Animal models for preclinical studies for cartilage repair. *Chilean Society of Orthopaedics and Traumatology (SCHOT) XLVI Congress*, Puerto Varas, Chile, November 2011.

Rodeky WG. Biologic treatment options for the knee: Meniscus scaffolds. *8th Biennial ISAKOS Congress*, Rio de Janeiro, Brazil, May 2011.

Rodeky WG. Bone marrow-derived culture-expanded stem cells in conjunction with microfracture to treat chondral lesions in an equine model. *International Society for Hip Arthroscopy*, Paris, France, October 2011.

Rodeky WG. Bone-marrow derived culture-expanded mesenchymal stem cells in conjunction with microfracture to treat chondral lesions in an equine model. *8th Biennial ISAKOS Congress*, Rio de Janeiro, Brazil, May 2011.

Rodeky WG. Complications in arthroscopic surgery: Microfracture. *8th Biennial ISAKOS Congress*, Rio de Janeiro, Brazil, May 2011.

Rodeky WG. Debate Chairman. Meniscus transplantation: Human allografts vs. mammalian xenografts. *8th Biennial ISAKOS Congress*, Rio de Janeiro, Brazil, May 2011.

Rodeky WG. Evaluation of cartilage repair tissue. *ICRS 4th Surgical Skills Course*, Rostock, Germany, August 2011.

Rodeky WG. Evaluation of cartilage repair tissue. *Perugia University Orthopaedics and Traumatology Program*, Arezzo, Italy, November 2011.

Rodeky WG. Hyaluronic acid and bone marrow-derived mesenchymal stem cells in conjunction with microfracture to treat chondral lesions in an equine model. *SCHOT XLVI Congress*, Puerto Varas, Chile, November 2011.

Rodeky WG. Meniscus replacement with Menaflex™ collagen meniscus implants (CMI): Recent results. *Knee Surgery for Sports Injuries Course*, Dublin, Ireland, September 2011.

Rodeky WG. Microfracture plus stem cells for augmentation in an equine model. *ICRS 4th Surgical Skills Course*, Rostock, Germany, August 2011.

Rodeky WG. Microfracture: Getting it right! *ICRS 4th Surgical Skills Course*, Rostock, Germany, August 2011.

Rodeky WG. Microfracture: Indications, technique, rehabilitation and results. *SCHOT XLVI Congress*, Puerto Varas, Chile, November 2011.

Rodeky WG. Microfracture: Indications, techniques, rehabilitation and results. *Knee Surgery for Sports Injuries Course*, Dublin, Ireland, September 2011.

Rodeky WG. Outcomes of cartilage repair procedures: What do we measure? *SCHOT XLVI Congress*, Puerto Varas, Chile, November 2011.

Rodeky WG. Regenerative medicine in meniscus repair: Clinical aspects, techniques, and outcomes. *Visiting Professor, Danube University Krems, Vienna (Krems)*, Austria, October 2011.

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In the Media

Institute Scientists Mentor Students to Top Honors in Regional Science Fair

Provided guidance and support during their journey from the classroom to the laboratory

Vail, Colorado, seventh grader, Sydney Sappenfield, a student at Vail Mountain School (VMS), recently took home the gold medal in the regional state science fair. The Annual Meeting of the Colorado Wyoming Junior Academy of Science was held Friday, April 27, at the University of Northern Colorado in Greeley. After receiving special guidance from scientists at the Steadman Philippon Research Institute, Sappenfield, along with several other classmates, won prizes for Most Scientific and Best Overall projects at their school science fair in February, and were among more than 100 seventh and eighth grade students from across the state chosen to compete in Greeley.

In February, Coen A. Wijdicks, Ph.D., director of the Department of BioMedical Engineering and senior staff scientist at SPRI, visited VMS and attended the science fair with Kyle Jansson, SPRI senior mechanical engineer, and Mary Goldsmith, SPRI robotics engineer. During their visit, they offered suggestions to students on how to create experiments that would yield the most meaningful data and



Left: Kyle Jansson, B.S., Senior Mechanical Engineer (SPRI); Center: Sydney Sappenfield, Student at Vail Mountain School; Gold-Medal Winner; Right: Coen Wijdicks, Ph.D., Director of the Department of BioMedical Engineering and Senior Staff Scientist (SPRI).



Students from Vail Mountain School posed with their science fair award certificates.

provide applicable conclusions. Just prior to the science fair, a self-selected group of students traveled to the Institute, where they had the opportunity to observe how researchers there use the scientific method in their work.

SPRI is known worldwide for the research and development of new procedures and techniques in the advancement of orthopaedic medicine. Similar to real scientific laboratories on the SPRI campus, students who participated in the science fair provided a hypothesis, performed experiments, analyzed data, and drew conclusions.

Winners included Sappenfield, for her work on tendon graft strength commonly used for ACL reconstruction, as well as Nicholas Charles and Paco Holguin (silver medals), and Dylan Cunningham (bronze medal). The team of students met regularly following the February fair to create a slideshow presentation and prepare themselves for the regional competition. Each student walked away with various awards and honors during that competition.

Mr. Falk, who accompanied the students to Greeley, along with Mr. Ross Sappenfield, science department chair and upper school science teacher for VMS, commented, “The students did a terrific job presenting their projects at this high level of competition. They were wonderful ambassadors for Vail Mountain School and are congratulated on their fine efforts.”

For students who have a passion for science, the annual science fair provides an opportunity to be creative and resourceful, and unleashes the hidden talents that help produce original and imaginative projects.

According to Dr. Wijdicks, “Our young scientists hold the key to the future. Science fairs across the country allow students to exercise the resources they learn in their science classes, and apply these methods and techniques to various

topics and experiments. It was very rewarding mentoring the students and working with them on ways to better understand the dynamics behind producing an authentic experiment.”

If your school is interested in taking a tour of the SPRI science laboratories, or if you would like to coordinate a speaker, visit the Steadman Philippon Research Institute for more information: <http://www.sprivail.org>.

Recognition

American Academy of Orthopaedic Surgeons Honors Drs. Philippon, LaPrade, Millett, and Clanton with 2012 AAOS Achievement Award

Orthopaedic surgeons from the Steadman Philippon Research Institute were honored during the American Academy of Orthopaedic Surgeons (AAOS) Annual Meeting in San Francisco this past winter. The annual meeting, which brought orthopaedic surgeons from around the world together to discuss and present the latest developments surrounding orthopaedic surgery and research, took place February 7-11 at the Moscone Center in San Francisco, CA.

Aside from presenting on specific topics in their specialized area of orthopaedic surgery, the following physicians were honored with the 2012 AAOS Achievement Award:

- Dr. Marc Philippon, Orthopaedic Hip Surgeon
- Dr. Robert LaPrade, Orthopaedic Knee Surgeon
- Dr. Peter Millett, Orthopaedic Shoulder Surgeon
- Dr. Robert Clanton, Orthopaedic Foot and Ankle Surgeon

The 2012 Achievement Award is given to specific members of AAOS to thank them for their many contributions to education, research, and advocacy in orthopaedics.

Drs. Philippon and Millett serve on the Board of Directors for SPRI. Dr. LaPrade is chief research officer, and Dr. Clanton is also a vital part of the ongoing research studies and programs that take place at the Institute.

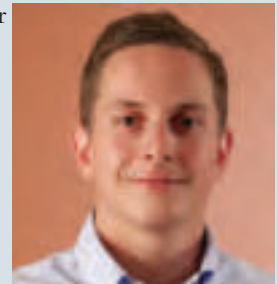
In addition to the 2012 AAOS Achievement Awards, Dr. Peter Millett was also honored with the Distinguished Service Award for Best and Most Innovative Instructional Surgical Technique for his instructional video demonstrating arthroscopic axillary nerve release for the treatment of compressive axillary nerve injuries and quadrilateral space syndrome in the shoulder.

The Annual AAOS Meeting offered a variety of presentations, discussions, and information surrounding the latest clinical studies associated with orthopaedic research. The Academy provides education and practice management services for orthopaedic surgeons and allied health professionals. The Academy also serves as an advocate for improved patient care and informs the public about the science of orthopaedics.

Founded as a not-for-profit organization in 1933, the Academy has grown from a small organization serving less than 500 members to the world's largest medical association of musculoskeletal specialists. The Academy now serves more than 34,000 members internationally.

Coen Wijdicks, Ph.D., Named Outstanding Reviewer of the Year for 2012 by ESSKA

Coen Wijdicks, Ph.D., Director of the Department of BioMedical Engineering and Senior Staff Scientist with the Steadman Philippon Research Institute in Vail was recently named “Outstanding Reviewer of the Year” for 2012 by the European Society of Sports Traumatology Knee Surgery and Arthroscopy (ESSKA). The announcement was made in the journal, *Knee Surgery, Sports Traumatology, Arthroscopy (KSSTA)* - The Official Journal of ESSKA.



Dr. Wijdicks has been an instrumental contributor towards many diverse research studies affiliated with the Institute. His research focus is on translational research for current clinical needs with an emphasis on a bench-to bedside focus. Some of his studies include novel methods to stimulate tissue regeneration via biologic growth factors to promote healing, radiographic quantification related to common injuries of the knee and shoulder, and the development of new ligament reconstructions with biomechanical validation to optimize surgical reconstructions of common ligament injuries.

He has published over 50 peer-reviewed scientific articles in high level journals, presented over 100 abstracts to national and international meetings, and received over 10 awards for his, and colleagues', overall excellence in research. Most notably in June of 2010, Dr. Wijdicks was awarded



the prestigious Nicola's Foundation Young Researcher Award, which is given to the best scientific manuscript in the field of knee surgery at the Bi-annual ESSKA Congress.

The Institute extends its deepest congratulations to Dr. Wijdicks for his extraordinary efforts.

Institute Designated as an International Teaching Center

The International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine (ISAKOS) and the International Cartilage Repair Society (ICRS) recently designated the Institute as a center for teaching excellence.

An ICRS teaching center is recommended for unique one-on-one learning experiences and practical advice from the world's leading experts on current state-of-the-art cartilage repair surgical techniques, patient evaluation, and non-operative treatment of cartilage injury. These sites also serve as outstanding professional development experiences for Fellows, residents, and students interested in improving their practical skills in this field.

ISAKOS teaching centers have been approved to host physicians who request further training and/or exposure to arthroscopy, knee surgery, and orthopaedic sports medicine.

ISAKOS is an international society of surgeons established to advance the worldwide exchange and dissemination of education, research, and patient care in arthroscopy, knee surgery, and orthopaedic sports medicine.

ICRS is a forum for international collaboration in cartilage tissue research by bringing together basic scientists and clinical researchers engaged or interested in the field of cartilage biology and tissue engineering.

Arthroscopy Journal Recognizes Study on Femoroacetabular Impingement by Dr. Philippon

Dr. Marc Philippon, Dr. Todd Johnston, Karen Briggs, and Mara Schenker recently received a certificate of commendation from *Arthroscopy - The Journal of Arthroscopic and Related Surgery* for their research study on femoroacetabular impingement. According to *Arthroscopy*, Dr. Philippon's orthopaedic research article, "Relationship Between Offset Angle Alpha and Hip Chondral Injury in Femoroacetabular Impingement," was one of the top ten most cited articles for 2008-2011.

The editors wish to thank the authors and extend their appreciation for this outstanding scientific work that is among the top ten recent articles in number of citations.

Arthroscopy is the leading peer-reviewed journal in the field. Every issue enables the reader to put into perspective

the usefulness of the various emerging arthroscopic techniques. *Arthroscopy* is ranked 3rd of 61 journals in the orthopaedics category on the 2010 Journal Citation Reports®, published by Thomson Reuters, and has an Impact Factor of 3.317.

Dr. Philippon's "Hip Arthroscopy for Femoroacetabular Impingement in Patients Aged 50 Years or Older" Tops Week's January 3 - January 10 Best Articles

According to MD Linx Orthopedics, Dr. Marc Philippon's study, "Hip Arthroscopy for Femoroacetabular Impingement in Patients Aged 50 Years or Older," was at the top of the list of the week's best articles published in *Arthroscopy* for January 3 - January 10.

Journal Ranks Dr. LaPrade's Research on Posterolateral Knee Injuries "Top 10" in 2011

The lead editor, Vernon Tulo, M.D., for the *Journal of Bone and Joint Surgery (JBJS)*, considered the premier orthopaedic surgery journal, has chosen the "Top Ten" Editor's choice peer-reviewed publications for 2011. Of these 10 high-level articles, only one was a sports medicine publication, and it was ranked #9. The article, "Outcomes of Treatment of Acute Grade-III Isolated and Combined Posterolateral Knee Injuries: A Prospective Case Series and Surgical Technique", by Dr. Andrew Geeslin and Dr. Robert F. LaPrade was published in the September 21, 2011, issue of *JBJS*.

This article was chosen from several hundred peer-reviewed publications in *JBJS* in 2011.

Orthopaedic Surgeons Meet in Vail to Learn the Latest Advancements Surrounding Arthroscopic Hip Surgery

The Steadman Philippon Research Institute was the host for this worldwide symposium

The 7th Annual Vail Hip Arthroscopy Symposium took place March 15-17 at the Vail Cascade Resort in Vail, Colorado. Dr. Marc Philippon served as the course chairman. More than 200 orthopaedic surgeons and medical professionals from the U.S., China, and around the globe, along with faculty from five different countries, gathered for the conference to hear lectures from world leaders in hip arthroscopy



and to learn the latest techniques associated with arthroscopic hip surgery.

Keynote speakers during the event included Dr. Richard Villar from London, who presented on the history of hip arthroscopy, and Dr. Richard Steadman from Vail, who discussed the development and validation of the microfracture technique. Dr. Steadman initially developed the microfracture technique for the knee, and it is now being performed in the elbow, shoulder, foot, ankle, and hip joints. Dr. Martin Beck of Switzerland gave a keynote lecture on the history of femoroacetabular impingement in the hip.

Dr. Philippon and faculty members gave over 40 presentations during the two-day meeting. At the top of the agenda were presentations on selecting which patients would benefit best from hip arthroscopy. In addition, Dr. Philippon, who is a pioneer in arthroscopic hip surgery, addressed the group on surgical techniques for treating labral tears, impingement, and labral reconstruction. He provided information on patient outcomes and highlighted how the advancement of arthroscopy is creating positive results in athletes who sustain serious hip injuries. Karen Briggs, director of The Center for Outcomes-Based Orthopaedic Research at the Steadman Philippon Research Institute, presented the Vail Hip Score—a system of measuring patient outcomes following arthroscopic hip surgery. Many other topics, including new techniques for complicated injuries in the hip such as hip dislocation, and injuries to the tendons surrounding the hip, were discussed.

Representatives from Smith & Nephew, a global medical technology company dedicated to helping improve people's lives through advanced products developed for orthopaedic surgery, wound management, and sports medicine, were on-hand to participate in the event.

“At Smith & Nephew, we have a strong surgeon training heritage and focus. A cornerstone of this focus has been the opportunity to work with world-renowned surgeons such as Dr. Philippon, and leading institutions such as Steadman Philippon Research Institute to provide surgeons with state-of-the-art training, tools, and techniques needed to support

their continued learning,” said John Mahoney, group director of Medical Education for Smith & Nephew.

“If surgeons are to meet the demands created by new standards and technologies such as those used in hip arthroscopy, their professional development must be ongoing and substantive. That is what makes this hip course so valuable for the participants from around the world who came to the Institute to learn the latest techniques and concepts in treatment of hip pathologies,” Mahoney continued.

According to Dr. Philippon, “Science continues to progress and the results of these studies greatly impact how we repair serious and degenerative hip related injuries. The insights gained from the meeting will continue to lead us into new areas of research initiatives as we strive to continue to find new techniques that will ultimately improve patient outcomes.”

Orthopaedic Researchers From Around the World Meet in Vail to Discuss the Latest Advancements in Stem Cell, PRP and Growth Factor Therapy, and Biologic Scaffolds for the Treatment of Sports Related Injuries

Steadman Philippon Research Institute leads new initiatives into ongoing research studies associated with platelet-rich plasma therapy to stimulate healing

Orthopaedic surgeons and research scientists from the Steadman Philippon Research Institute in Vail recently met with various leaders in the field to discuss how their medical community is advancing the use of platelet-rich plasma therapy (PRP), growth factors, and stem cells to heal sports-related injuries.

The “Biologic Treatments for Sports Injuries” symposium took place March 3–4 in Vail. Dr. Robert LaPrade, orthopaedic knee surgeon with the Steadman Clinic and the chief medical research officer for the Steadman Philippon Research Institute, served as the co-chair and local host to more than 30 orthopaedic and sports medicine professionals from Cornell, Colorado State University, Harvard, Pittsburgh, Duke, and Stanford, as well as abroad from Canada, the U.K., and Norway.

The purpose of the symposium, which was the first ever of its kind among orthopaedic surgeons, was to discuss the present state of tissue healing through the use of stem cells and applied growth factors such as PRP. While researchers agree that the science behind PRP offers a natural healing process for biologically compromised tissues, the group also presented valid obstacles in research and discussed areas that



Orthopaedic researchers from around the world meet in Vail.

needed to be improved so that critical advancements could be made in order to make this treatment a more realistic option at the clinical level to treat patients with injury.

Throughout the weekend, researchers presented topics on a variety of issues relating to PRP and concluded that while the orthopaedic industry believes the use of these growth factors can improve the repair process and possibly shorten the healing and recovery period, there is still an overall lack of research that has been concluded to offer this treatment on a higher, more mainstream level.

According to Dr. LaPrade, “While science has progressed greatly in the past decade, offering significant promise in the area of PRP, stem cells, and growth factors, future studies and additional research are needed so that we can take what we are learning at the scientific level and turn these into realistic, credible treatment recommendations for patients who are under the care of their orthopaedic physician.”

The meeting ended with a new agenda in the area of PRP exploration, including a collective effort to expand on-going studies through new grants and research initiatives in order to solve the questions presented during the symposium.

Institute Scientists Meet Leading International Hip Authorities in Paris to Discuss the Latest Advancements and Techniques

Researchers from the Steadman Philippon Research Institute (SPRI) joined more than 40 hip experts last fall for the 3rd Annual International Society for Hip Arthroscopy (ISHA) Scientific Meeting in Paris, France. The two-day meeting, which took place mid-October, was sponsored by

ISHA and included a variety of symposia, lectures, debates, and paper presentations specifically related to advancements in hip arthroscopic surgery.

Dr. Marc Philippon, director of Hip Research at SPRI, is a founding member of ISHA. He participated in two debates, one on advanced hip arthroscopy and labral reconstruction, and another on treatment of the iliopsoas. The labrum is what makes a seal between the pelvis and the femur at the hip. The iliopsoas is an area within the hip consisting of a combination of three muscles that control hip flexion.

A variety of other hip related topics took place during the weekend. Karen Briggs, director of the Center for Outcomes-Based Orthopaedic Research at SPRI, presented studies on patient outcomes following hip arthroscopy in the adult dysplastic hip, as well as the prevalence of abnormal hip findings in subjects with no hip pain. She also participated in a panel discussion detailing patient outcomes and presented data on the Vail Hip Score.

Dr. William Rodkey, SPRI’s chief scientific officer and director of the Center for Translational and Regenerative Medicine Research, presented his paper, “Bone Marrow-Derived Culture-Expanded Mesenchymal Stem Cells in Conjunction with Microfracture to Treat Chondral Lesions in an Equine Model.”

Dr. Philippon joined 11 other orthopaedic surgeons to formally establish ISHA in Paris in May 2008. The society’s role is to be the premier international society for education and research in arthroscopic hip surgery. ISHA’s Founding Members represent the many individuals around the world who are interested in this evolving area of hip surgery and research. Dr. Philippon serves on the executive committee as research secretary.

Associates

The Institute is proud to recognize its team of associates who carry out the research and educational mission in Vail. The staff has been selected for its diverse training and background in biomechanics, engineering, clinical research, veterinary science, and computer science. Together, the staff members take a multidisciplinary approach to their work in solving orthopaedic sports medicine problems.

ADMINISTRATION

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Manager, Business Administration

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Administrative Assistant & Marketing Coordinator

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SURGICAL SKILLS LABORATORY

Kelly Adair
Surgical Skills Manager

CENTER FOR OUTCOMES BASED ORTHOPAEDIC RESEARCH (COOR)

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Ashley Darrough
Data Collection Coordinator

Grant Dornan
Statistician

Doug Gillard
Spine Research Coordinator

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Braden Hartline
Research Assistant

Marilee Horan, M.P.H.
Coordinator of Upper Extremity Research

Joel Huleatt
Research Assistant

Lauren Matheny
Coordinator of Lower Extremity Research

Ryan Warth
Research Assistant

BIOMEDICAL ENGINEERING

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Director

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BioMotion Laboratory Coordinator

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Senior Robotics Engineer

Kyle Jansson, B.S.
Senior Mechanical Engineer

Sean Smith
Research Engineer

Lourenco Peixoto, M.D.
Visiting Research Scholar

Kevin Campbell
Research Assistant

Nicholas Kennedy
Research Assistant

Max Michalski
Research Assistant

Catherine Wilson
Research Assistant

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Rachel Surowiec
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Barry Eckhaus
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AV/Multimedia Technician

Jason Gregg
Manager, IT

INDEPENDENT AUDITORS' REPORT

To the Board of Directors
Steadman Philippon Research Institute
Vail, Colorado

We have audited the accompanying consolidated statements of financial position of Steadman Philippon Research Institute and Affiliate (collectively, the "Institute") as of December 31, 2011 and 2010 and the related consolidated statements of activities, functional expenses, and cash flows for the years then ended. These consolidated financial statements are the responsibility of the Institute's management. Our responsibility is to express an opinion on these consolidated financial statements based on our audits.

We conducted our audits in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement. An audit includes consideration of internal control over financial reporting as a basis for designing audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Institute's internal control over financial reporting. Accordingly, we express no such opinion. An audit also includes examining, on a test basis, evidence supporting the amounts and disclosures in the consolidated financial statements, assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall consolidated financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of Steadman Philippon Research Institute and Affiliate as of December 31, 2011 and 2010 and the results of their activities and their cash flows for the years then ended in conformity with accounting principles generally accepted in the United States of America.

Ehrhardt Keefe Steiner & Hottman PC

May 24, 2012
Denver, Colorado

Consolidated Statements of Financial Position

ASSETS	December 31	
	2011	2010
Current assets		
Cash and cash equivalents	\$ 879,798	\$ 1,613,039
Accounts receivable	10,463	342,000
Accounts receivable, related parties	12,313	2,349
Contributions receivable, current portion	436,800	338,200
Contributions receivable, related parties	750	750
Prepaid expenses and other assets	2,514	2,014
Investments	4,664,307	4,801,823
Inventory	501,680	-
Total current assets	6,508,625	7,100,175
Contributions receivable, less current portion	579,901	839,327
Property and equipment, net	4,945,782	2,300,316
Investments - other	227,050	227,050
Total assets	\$12,261,358	\$10,466,868
LIABILITIES AND NET ASSETS		
Current liabilities		
Accounts payable	\$65,453	\$58,344
Accrued expenses	184,000	253,105
Line-of-credit	9,099	340,019
Current portion of long-term debt	246,991	10,841
Current portion of capital leases	510,698	434,150
Current portion of deferred rent	153,622	153,622
Total current liabilities	1,169,863	1,250,081
Long-term liabilities		
Long-term debt, net of current portion	949,535	7,520
Capital leases, net of current portion	477,655	988,354
Deferred tax liability	122,000	101,000
Deferred rent, net of current portion	153,618	307,242
Total liabilities	2,872,671	2,654,197
Commitments		
Net assets		
Unrestricted	7,790,023	6,227,713
Temporarily restricted	1,598,664	1,584,958
Total net assets	9,388,687	7,812,671
Total liabilities and net assets	\$12,261,358	\$10,466,868

See Notes to Financial Statements

Consolidated Statements of Activities

	For the Years Ended					
	December 31, 2011			December 31, 2010		
	Unrestricted	Temporarily Restricted	Total	Unrestricted	Temporarily Restricted (Restated)	Total
REVENUES, GAINS, AND OTHER SUPPORT						
Contributions	\$1,164,196	\$537,374	\$1,701,570	\$1,777,762	\$1,444,760	\$3,222,522
Grants	-	523,463	523,463	-	218,578	218,578
Corporate sponsors	3,689,366	727,499	4,416,865	853,566	500,032	1,353,598
Fundraising events	361,888	-	361,888	299,221	-	299,221
Surgical skills lab	95,371	-	95,371	15,000	-	15,000
Video income	2,480	-	2,480	2,190	-	2,190
MRI and other income	1,336,175	-	1,336,175	1,262,839	-	1,262,839
	6,649,476	1,788,336	8,437,812	4,210,578	2,163,370	6,373,948
Net assets released from restrictions	1,774,630	(1,774,630)	-	1,426,906	(1,426,906)	-
Total revenues, gains, and other support	8,424,106	13,706	8,437,812	5,637,484	736,464	6,373,948
Expenses and losses						
BioMedical engineering	1,519,245	-	1,519,245	1,138,534	-	1,138,534
Basic science	239,314	-	239,314	232,257	-	232,257
Surgical skills and education	1,362,029	-	1,362,029	434,481	-	434,481
Clinical research	894,944	-	894,944	817,412	-	817,412
Information services	228,300	-	228,300	201,525	-	201,525
Imaging research	839,220	-	839,220	693,488	-	693,488
Management and general	631,537	-	631,537	580,718	-	580,718
Fundraising	708,733	-	708,733	659,574	-	659,574
Total expenses and losses	6,423,322	-	6,423,322	4,757,989	-	4,757,989
Other (expense) income						
Investment return	(135,285)	-	(135,285)	527,423	-	527,423
Interest expense	(85,218)	-	(85,218)	(69,251)	-	(69,251)
Total other (expense) income	(220,503)	-	(220,503)	458,172	-	458,172
Provision for income tax	(217,971)	-	(217,971)	(342,000)	-	(342,000)
Change in net assets	1,562,310	13,706	1,576,016	995,667	736,464	1,732,131
Net assets at beginning of year	6,227,713	1,584,958	7,812,671	5,232,046	848,494	6,080,540
Net assets at end of year	\$ 7,790,023	\$ 1,598,664	\$ 9,388,687	\$ 6,227,713	\$ 1,584,958	\$ 7,812,671

See Notes to Financial Statements

Consolidated Statements of Cash Flows

	For the Year Ended December 31	
	2011	2010 (Restated)
Cash flows from operating activities		
Change in net assets	\$ 1,576,016	\$ 1,732,131
Adjustments to reconcile change in net assets to net cash provided by operating activities		
Depreciation and amortization expense	1,232,320	615,692
Net loss (gain) on investments	139,404	(510,425)
Donated stock	-	(22,346)
Amortization of deferred rent	(153,624)	(153,624)
Deferred taxes	21,000	50,000
Changes in assets and liabilities		
Accounts receivable	321,573	(342,676)
Contributions receivable	160,826	(931,101)
Prepaid expenses and other assets	(500)	-
Inventory	(501,680)	-
Accounts payable	7,109	19,032
Accrued expenses	(69,105)	(195,231)
	1,157,323	(1,470,679)
Net cash provided by operating activities	2,733,339	261,452
Cash flows from investing activities		
Purchase of investments	(9,924)	-
Proceeds from sale of investments	8,036	22,958
Additions to buildings and equipment	(3,877,786)	(324,469)
Net cash used in investing activities	(3,879,674)	(301,511)
Cash flows from financing activities		
Payments on capital leases	(434,151)	(417,032)
Net borrowings (payments) on long-term debt	1,178,165	(10,336)
Net (payments) borrowings on line-of-credit	(330,920)	324,873
Net cash provided by (used in) financing activities	413,094	(102,495)
Net decrease in cash and cash equivalents	(733,241)	(142,554)
Cash and cash equivalents at beginning of year	1,613,039	1,755,593
Cash and cash equivalents at end of year	\$ 879,798	\$ 1,613,039

Supplemental disclosure of cash flow information:

Cash paid for interest was \$85,218 and \$69,251 for the years ended December 31, 2011 and 2010, respectively.

Cash paid for income taxes was \$246,889 and \$376,000 for the years ended December 31, 2011 and 2010, respectively.

See Notes to Financial Statements

Consolidated Statement of Functional Expenses

For the Year Ended December 31, 2011

	Program Services						Support Services			
	Biomechanics Research	Basic Science	Bioskills and Education	Clinical Research	Information Services	Imaging Research	Total	Management and General	Fundraising	Total
Salaries and benefits	\$ 778,641	\$ 125,641	\$ 290,537	\$ 552,820	\$ 158,106	\$ 237,002	\$ 2,142,747	\$ 276,165	\$ 137,878	\$ 2,556,790
Consulting and contract labor	42,064	21,394	1,641	188,149	6,197	52,329	311,774	47,984	65,088	424,846
Supplies (office, computer, lab)	93,616	4,186	374,842	47,079	4,292	9,742	533,757	12,532	4,174	550,463
Events and fundraising	-	-	-	-	-	-	-	10,000	280,379	290,379
Printing	8,669	1,229	392	3,404	396	21	14,300	863	89,524	104,687
Maintenance and supplies	42,113	67	18,259	11,019	1,108	1,029	73,595	5,653	4,041	83,289
Rent and leases	35,963	8,385	24,169	10,222	22,780	38,298	139,817	6,437	2,986	149,240
Telephone and utilities	56,822	4,929	33,228	15,036	7,315	14,901	132,231	12,268	3,118	147,617
Travel	78,549	44,218	263	23,666	1,982	64,993	213,671	69,457	5,856	288,984
Legal and accounting	42,473	214	1,486	12,916	2,949	8,843	68,881	8,419	1,554	78,854
Fellows	-	-	71,523	-	-	5,279	76,802	-	-	76,802
Education meetings/lectures	-	-	33,909	-	-	-	33,909	-	-	33,909
Direct mail/planned giving	-	-	-	-	-	-	-	-	85,128	85,128
Meals and entertainment	8,627	4,773	1,906	1,593	635	3,297	20,831	19,222	850	40,903
Gifts	5,466	3,170	960	3,880	1,036	1,905	16,417	42,019	3,199	61,635
Postage	3,047	(29)	19,885	(4,004)	264	773	19,936	2,867	11,463	34,266
Insurance	1,503	194	339	1,358	-	339	3,733	90,888	242	94,863
Meeting fees/registrations and dues and subscriptions	16,183	3,502	18,063	2,445	20	-	40,213	4,030	2,380	46,623
Bank/credit card fees	-	-	-	-	-	-	-	12,338	-	12,338
Meetings (Board and SAC)	-	7,441	-	-	-	-	7,441	1,478	-	8,919
Grant writing/medical editing	-	-	-	-	-	-	-	-	6,788	6,788
Research grant	-	10,000	-	-	-	-	10,000	-	-	10,000
Advertising	2,000	-	90	390	-	-	2,480	450	749	3,679
	1,215,736	239,314	891,492	869,973	207,080	438,940	3,862,535	623,070	705,397	5,191,002
Depreciation and amortization	303,509	-	470,537	24,971	21,220	400,280	1,220,517	8,467	3,336	1,232,320
Total	\$ 1,519,245	\$ 239,314	\$ 1,362,029	\$ 894,944	\$ 228,300	\$ 839,220	\$ 5,083,052	\$ 631,537	\$ 708,733	\$ 6,423,322

See Notes to Financial Statements

Consolidated Statement of Functional Expenses

For the Year Ended December 31, 2010

	Program Services						Support Services		
	Biomechanics Research	Basic Science	Bioskills and Education	Clinical Research	Information Services	Imaging Research	Management and General	Fundraising	Total
Salaries and benefits	\$751,238	\$56,312	\$183,551	\$598,311	\$129,579	\$152,324	\$337,661	\$161,472	\$2,370,448
Consulting and contract labor	37,805	99,571	1,117	69,744	11,528	51,878	6,485	83,745	361,873
Supplies (office, computer, lab)	33,464	362	45,534	13,300	2,501	3,003	5,415	2,092	105,671
Events and fundraising	-	-	-	-	-	-	10,000	173,898	183,898
Printing	14,346	429	629	12,429	678	326	3,459	66,309	98,605
Maintenance and supplies	29,206	1	2,496	11,664	1,146	1,048	6,235	3,977	55,773
Rent and leases	25,247	10,034	17,392	11,298	21,125	38,684	7,583	2,998	134,361
Telephone and utilities	34,707	3,404	22,918	16,394	8,468	15,784	11,876	3,593	117,144
Travel	44,247	39,847	-	19,037	89	18,393	36,800	14,309	172,722
Legal and accounting	37,060	-	8,893	15,781	3,666	6,523	13,899	4,294	90,116
Fellows	-	-	36,608	-	-	4,567	-	-	41,175
Education meetings/lectures	-	-	22,673	-	-	-	-	-	22,673
Direct mail/planned giving	-	-	-	-	-	-	-	96,647	96,647
Meals and entertainment	4,800	2,830	(5,340)	3,425	291	1,248	13,040	11,102	31,396
Gifts	1,752	2,169	195	1,809	389	389	24,668	1,428	32,799
Postage	2,067	35	8,146	23,023	1,356	132	3,065	18,456	56,280
Insurance	1,115	-	90	1,252	-	-	72,960	159	75,576
Meeting fees/registrations and dues and subscriptions	12,731	3,820	22,819	5,706	500	-	2,295	763	48,634
Bank/credit card fees	-	-	-	-	-	-	11,707	-	11,707
Meetings (Board and SAC)	-	13,424	-	-	-	-	1,032	-	14,456
Grant writing/medical editing	450	-	-	450	-	-	-	8,050	8,950
Advertising	2,000	-	90	-	-	-	5,062	4,241	11,393
	1,032,235	232,238	367,811	803,623	181,316	294,299	573,242	657,533	4,142,297
Depreciation and amortization	106,299	19	66,670	13,789	20,209	399,189	7,476	2,041	615,692
Total	\$ 1,138,534	\$ 232,257	\$ 434,481	\$ 817,412	\$ 201,525	\$ 693,488	\$ 580,718	\$ 659,574	\$ 4,757,989

See Notes to Financial Statements

Notes to Financial Statements

NOTE 1 - ORGANIZATION AND SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Organization

The Steadman Philippon Research Institute (“SPRI”), a non-profit organization, was incorporated in the state of Colorado on February 22, 1999 and is a tax-exempt organization under Section 501(c)(3) of the Internal Revenue Code (“IRC”). SPRI is located in Vail, Colorado, and is dedicated to keeping people of all ages physically active through orthopaedic sports medicine research and education in the areas of arthritis, healing, rehabilitation, and injury. SPRI’s primary sources of support are public donations, grants, special events, and corporate partners.

SPRI has agreements with several corporations who sponsor SPRI’s research. This research is for the general use of and publication by SPRI. These agreements are recorded as income in the year the research is performed and payment is received.

In 2010, SPRI created the SPRI Leasing Corporation, a wholly owned subsidiary, in order to hold the assets, liabilities, revenues, and expenses derived from SPRI’s MRI scanner.

Principles of Consolidation

The reporting entity referred to as Steadman Philippon Research Institute and Affiliate (collectively, the “Institute”) includes the accounts of SPRI and SPRI Leasing Corporation. All intercompany accounts and transactions have been eliminated in consolidation.

Basis of Presentation

The Institute reports information regarding its financial position and activities according to three classes of net assets: unrestricted net assets, temporarily restricted net assets, and permanently restricted net assets.

Unrestricted amounts are those currently available at the discretion of the Board of Directors (“Board”) for use in the Institute’s operations, fundraising, and certain programs.

Temporarily restricted amounts are monies restricted by donors specifically for certain purposes or programs; these monies are available for use by the Institute for the restricted purpose.

Permanently restricted amounts are assets that must be maintained permanently by the Institute as required by the donor, but the Institute is permitted to use or expend part or all of any income derived from those assets. As of December 31, 2011 and 2010, the Institute did not have any permanently restricted amounts.

Cash and Cash Equivalents

The Institute considers all highly liquid investments with a maturity of three months or less when purchased to be cash equivalents, unless held for reinvestment as part of the investment portfolio or otherwise encumbered. The Institute utilizes a sweep account that is not federally insured.

Accounts and Contributions Receivable

Accounts and contributions receivable represent amounts due from individuals and organizations in support of the Institute’s programs. Management considers all amounts collectible; therefore, no allowance has been recorded as of December 31, 2011 and 2010.

Unconditional gifts expected to be collected within one year are reported at their net realizable value. Unconditional gifts expected to be collected in future years are reported at the present value of estimated future cash flows. The resulting discount is amortized using the level-yield method and is reported as contribution revenue.

Investments

The Institute reports investments in equity securities with readily determinable fair values and all investments in debt securities at their fair values with unrealized gains and losses included in the consolidated statements of activities.

The Institute holds alternative investments, which are not readily marketable and are carried at fair value as provided by the investment managers. The Institute reviews and evaluates the value provided by the investment managers and agrees with the valuation methods and assumptions used in determining the fair value of the alternative investments. Those estimated fair values may differ significantly from the values that would have been used had a ready market for these securities existed.

Investment return includes dividend, interest, and other investment income; realized and unrealized gains and losses on investments carried at fair value; and realized gains and losses on other investments. Investment return is reflected in the consolidated statements of activities as unrestricted, temporarily restricted, or permanently restricted based upon the existence and nature of any donor or legally imposed restrictions.

Inventory

Inventory is stated at the lower of cost (first-in, first-out method) or market and consists of medical supplies. Donated medical supplies consisting of medical implants and cadaveric specimens used for medical research are included in inventory.

Property and Equipment

Land, buildings and improvements, and equipment purchased by the Institute are recorded at cost. Donated fixed assets are capitalized at fair value at the date of donation. Depreciation is provided on the straight-line method based upon the estimated useful lives of the assets, which range from five to 40 years. Leasehold improvements are amortized over the shorter of the lease term plus renewal options or the estimated useful lives of the improvements.

Other Investments

During 2009, the Institute received a contribution of real estate, which is recorded at estimated fair value. The investment is assessed for impairment if events and circumstances warrant such a review.

Deferred Rent

Tenant improvement allowances paid by the landlord are recorded as deferred rent and are recognized as a reduction of rent expense over the term of the related lease.

Contributions

Gifts of cash and other assets received without donor stipulations are reported as unrestricted support. Gifts received with a donor stipulation that limits their use are reported as temporarily or permanently restricted support. When a donor-stipulated time restriction ends or purpose restriction is accomplished, temporarily restricted net assets are reclassified to unrestricted net assets and reported in the consolidated statements of activities as net assets released from restrictions.

Gifts of land, buildings, equipment, and other long-lived assets are reported as unrestricted support unless explicit donor stipulations specify how such assets must be used, in which case the gifts are reported as temporarily or permanently restricted support. Absent explicit donor stipulations for the time long-lived assets must be held, expirations of restrictions resulting in reclassification of temporarily restricted net assets as unrestricted net assets are reported when the long-lived assets are placed in service.

Revenue Recognition

MRI and other income are recognized at the time the services are provided.

Functional Expenses

Expenses incurred directly for a program service are charged to such program. Allocations of certain overhead costs are also allocated to programs on a pro-rata basis of total space occupied by each service or by headcount.

Income Taxes

SPRI is exempt from federal income taxes under Section 501(c)(3) of the IRC. SPRI is not a private foundation within the meaning of Section 509(a) of the IRC. SPRI Leasing Corporation is a for-profit corporation that is required to file a corporate income tax return for its operations and recognizes deferred tax assets and liabilities based upon differences between its basis of assets for tax and financial reporting purposes.

The Institute applies a more-likely-than-not measurement methodology to reflect the financial statement impact of uncertain tax positions taken or expected to be taken in a tax return. After evaluating the tax positions taken, none are considered to be uncertain; therefore, no amounts have been recognized as of December 31, 2011. If incurred, interest and penalties associated with tax positions are recorded in the period assessed as general and administrative expense. No interest or penalties have been assessed as of December 31, 2011. Tax years that remain subject to examination include 2008 through the current year for federal returns and 2007 through the current year for state returns.

Use of Estimates

The preparation of consolidated financial statements in conformity with generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, disclosure of contingent assets and liabilities at the date of the consolidated financial statements, and the reported amounts of revenue, expenses, gains, losses, and other changes in net assets during the reporting period. Actual results could differ from those estimates.

Subsequent Events

The Institute has evaluated subsequent events through May 24, 2012, the date the consolidated financial statements were available to be issued, and has identified no events that require disclosure.

NOTE 2 - FAIR VALUE MEASUREMENTS AND INVESTMENTS

The Institute values its financial assets and liabilities based on the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. In order to increase consistency and comparability in fair value measurements, the following fair value hierarchy prioritizes observable inputs used to measure fair value into three broad levels, which are described below:

- Level 1: Quoted prices in active markets for identical assets or liabilities that are accessible at the measurement date. The fair value hierarchy gives the highest priority to Level 1 inputs.

Level 2: Other than quoted prices that are observable for the asset or liability either directly or indirectly.

Level 3: Unobservable inputs where little or no market data is available, which requires the reporting entity to develop its own assumptions.

In determining fair value, the Institute utilizes valuation techniques that maximize the use of observable inputs and minimize the use of unobservable inputs to the extent possible as well as considers counterparty credit risk in its assessment of fair value. These classifications (Levels 1, 2, and 3) are intended to reflect the observability of inputs used in the valuation of investments and are not necessarily an indication of risk or liquidity.

Following is a description of the valuation methodologies used for assets measured at fair value:

Common Stock, Mutual, and Money Market Funds: Valued at the closing price reported on the active market on which the individual securities are traded.

Limited Partnerships: Valued based on the net asset value per share of the fund.

Financial assets carried at fair value as of December 31, 2011 are classified in the table below in one of the three categories described above.

Description	Level 1	Level 2	Level 3	Total
Mutual funds				
Global equity	\$361,947	\$-	\$-	\$361,947
International value	214,169	-	-	214,169
Money market funds	1,054,605	-	-	1,054,605
Limited partnerships	-	3,033,586	-	3,033,586
Total	\$1,630,721	\$3,033,586	\$-	\$4,664,307

Financial assets carried at fair value as of December 31, 2010 are classified in the table below in one of the three categories described above.

Description	Level 1	Level 2	Level 3	Total
Common stock	\$ 8,198	\$ -	\$ -	\$ 8,198
Mutual funds				
Global equity	362,635	-	-	362,635
International value	252,796	-	-	252,796
Money market funds	1,052,599	-	-	1,052,599
Limited partnerships	-	3,125,595	-	3,125,595
Total	\$ 1,676,228	\$ 3,125,595	\$ -	\$ 4,801,823

Investments in certain entities that calculate net asset value per share are as follows:

Fund Description	December 31, 2011 Fair Value	December 31, 2010 Fair Value	Unfunded Commitments	Redemption Frequency	Redemption Notice Period
Absolute Return Funds	\$3,033,586	\$3,125,595	None	Quarterly to annually	30 to 90 Days

The Absolute Return Funds employ a strategy to achieve consistent positive, absolute returns with low volatility primarily by seeking to exploit pricing inefficiencies in equity and debt securities and by using a traditional hedge fund approach. The fair value of the investments has been calculated using the net asset value per share of the investments.

Investment return consists of the following:

	December 31,	
	2011	2010
Dividends and interest - reinvested	\$ 4,119	\$ 16,998
Net realized and unrealized (losses) gains	(139,404)	510,425
Total return on investments	\$ (135,285)	\$ 527,423

NOTE 3 - CONTRIBUTIONS

Contributions receivable consist of the following:

	December 31,	
	2011	2010
Due in less than one year	\$ 436,800	\$ 338,200
Due in one to five years	623,600	910,400
	1,060,400	1,248,600
Less unamortized discount	(43,699)	(71,073)
	\$ 1,016,701	\$ 1,177,527

The discount rate used was 3.25% for 2011 and 2010.

NOTE 4 - PROPERTY AND EQUIPMENT

The Institute's property and equipment are comprised of the following:

	December 31,	
	2011	2010
Equipment	\$ 454,166	\$ 410,372
Furniture and fixtures	140,043	97,477
Leasehold improvements	2,104,529	857,977
Machines and video equipment	1,428,392	1,202,747
Medical equipment	4,293,934	1,974,704
	8,421,064	4,543,277
Less accumulated depreciation and amortization	(3,475,282)	(2,242,961)
	\$ 4,945,782	\$ 2,300,316

NOTE 5 - LINE-OF-CREDIT

The Institute has an unsecured line-of-credit with a bank, which bears interest at the prime rate per annum less 0.25% (3.00% at December 31, 2011) and matures May 2012. The Institute reduced the line-of-credit amount from \$750,000 to \$250,000 during 2011. The outstanding balance was \$9,099 and \$340,019 at December 31, 2011 and 2010, respectively.

NOTE 6 - LONG-TERM DEBT

Long-term debt consists of the following:

	December 31,	
	2011	2010
Note payable to a bank, interest accruing at 4.75%, payable in monthly installments of principal and interest of \$958, due August 2012. The note is unsecured.	\$ 7,520	\$18,361
Note payable to a bank, interest accruing at 4.00%, payable in monthly installments of principal and interest of \$10,805, due May 2016. The note is unsecured	523,358	-
Note payable to a bank, interest accruing at 4.00%, payable in monthly installments of principal and interest of \$13,739, due June 2016. The note is secured by all business assets.	665,648	-
	1,196,526	18,361
Less current portion	(246,991)	(10,841)
Long-term portion of debt	\$ 949,535	\$ 7,520

Maturities of the notes payable are as follows:

For the Year Ending December 31,	
2012	\$ 246,991
2013	260,814
2014	271,589
2015	282,811
2016	134,321
	\$ 1,196,526

NOTE 7 - CAPITAL LEASES

The Institute has acquired assets under the provisions of capital leases. For financial reporting purposes, minimum lease payments relating to the assets have been capitalized. The leases expire between June 2012 and March 2014. Amortization of the leased property is included in depreciation expense. The assets under capital leases have cost and accumulated amortization as follows:

	December 31,	
	2011	2010
Equipment	\$ 2,188,507	\$ 2,188,507
Less accumulated amortization	(1,209,027)	(888,824)
	\$ 979,480	\$ 1,299,683

Maturities of capital lease obligations are as follows:

For the Year Ending December 31,	
2012	\$ 539,272
2013	387,536
2014	101,388
Total minimum lease payments	1,028,196
Amount representing interest	(39,843)
Present value of net minimum lease payments	988,353
Less current portion	(510,698)
Long-term capital lease obligation	\$ 477,655

NOTE 8 - RETIREMENT PLAN

The Institute has a defined contribution retirement plan (the "Plan") under IRC Section 401(k). Employees are eligible to participate in the Plan after one year of service. The Institute's contributions to the Plan are determined annually. The Institute contributed \$12,474 and \$15,388 to the Plan in fiscal years 2011 and 2010, respectively.

NOTE 9 - TEMPORARILY RESTRICTED NET ASSETS

The temporarily restricted net assets have been restricted by the donors to be used only for specified purposes and/or are time restricted until payments on contributions receivable are received as follows:

	December 31,	
	2011	2010
Assets available for		
Education	\$ 581,963	\$ 407,431
Assets available in future periods		
Education	122,663	192,996
Biomechanical and clinical research	643,029	872,583
Imaging	100,000	-
Time restricted only	151,009	111,948
Total contributions receivable	1,016,701	1,177,527
	\$ 1,598,664	\$ 1,584,958

NOTE 10 - RELATED PARTY TRANSACTIONS

During 2011 and 2010, the Institute received approximately \$534,000 and \$697,000, respectively, in contributions from related parties, including various Board members, as well as the Steadman Clinic (the "Clinic").

In addition, the Institute received \$1,323,540 and \$1,259,815 from the Clinic during 2011 and 2010, respectively, for the use of certain equipment.

NOTE 11 - INCOME TAXES

Income tax expense has been computed at the statutory rates applicable during the period. The components of taxes on income are as follows:

	For the Years Ended December 31,	
	2011	2010
Current		
Federal	\$ 172,824	\$ 256,000
State	23,927	36,000
	196,751	292,000
Deferred		
Federal	18,445	44,000
State	2,555	6,000
	21,000	50,000
	\$ 217,751	\$ 342,000

The Institute's deferred tax liabilities are a result of the difference in the tax and book basis of depreciable assets.

NOTE 12 - COMMITMENTS

Operating Leases

The Institute leases facilities under non-cancelable operating leases expiring between December 2013 and February 2016, which call for both base rent payments and operating expenses. Rent under these leases for the years ended 2011 and 2010 was \$149,240 and \$134,631, respectively.

Future minimum lease payments under these leases, which include the repayments for tenant improvement allowances, are as follows:

Year Ending December 31,	
2012	\$ 422,453
2013	313,924
2014	126,120
2015	127,062
2016	10,722
	\$ 1,000,281



A 501(c)(3) nonprofit organization

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