

STEADMAN PHILIPPON RESEARCH INSTITUTE

2009 Annual Report



An International Center For Research and Education—Keeping People Active SM

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The Institute wishes to express 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 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 US Open Golf Championships for 10 years, and the only American amongst 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 Steadman Philippon Research 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 Institute is an independent, tax-exempt (IRS code 501(c)(3)) charitable organization. Known throughout the world for its research into the causes, prevention, and treatment of orthopaedic disorders, the Institute is committed to solving orthopaedic problems that limit an individual's ability to maintain an active life.



The Institute has influenced the practice of orthopaedics — from diagnosis to rehabilitation. Recognizing that the body’s innate healing powers can be harnessed and manipulated to improve the natural healing process has led to exciting advances in surgical techniques that are used today by orthopaedists in many practices. The microfracture technique, for example, is now accepted as a treatment to enhance articular cartilage healing that may make it possible to postpone or even eliminate the need for joint replacement surgery. It has been independently estimated that more than one million patients have now been treated with microfracture to repair chondral defects. Today, the Institute is recognized worldwide for pioneering research of new arthroscopic procedures to treat femoral impingement in the hip and rotator cuff injuries in the shoulder.

The Institute collects data and publishes clinical research results on knees, hips, shoulders, and spine, and it has become the most published and one of the most innovative organizations in sports medicine research and education. The Institute publishes its findings in relevant scientific and medical journals and presents its 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. As a result of its Fellowship Program, the Institute now has a global network of more than 179 Fellows and associates who have put the advanced concepts they learned in their fellowships to good use in their orthopaedic practices.

Our focus is on improvement of function and quality of life. Future research will target predictors of disability caused by arthritis, predictors of successful surgery, predictors of patient satisfaction, patient expectation of treatment, and patient outcomes following surgery.

THE INSTITUTE’S PRIMARY AREAS OF RESEARCH AND EDUCATION ARE:

- **Basic Science Research** – undertakes biological studies to investigate the causes and effects of degenerative arthritis, techniques of cartilage regeneration, and basic biological healing processes.
- **Clinical Research** – conducts evidence-based medicine “outcomes” research based on actual clinical data that aids both physicians and patients in making better-informed treatment decisions.
- **Biomechanics Research** – studies dynamic joint function using motion analysis, computer modeling and dual-plane fluoroscopy imaging in an effort to understand injury mechanisms and to enhance rehabilitation techniques and outcomes. In addition, it utilizes in-vitro analysis using robotics and mechanical testing devices to develop, validate, and optimize reconstruction techniques related to common sports injury patterns.
- **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 fellowship training program, hosts conferences and international medical meetings, and produces and distributes publications and teaching visual media.

SINCE ITS INCEPTION, THE INSTITUTE HAS HELPED PEOPLE OF ALL AGES REMAIN PHYSICALLY ACTIVE THROUGH ORTHOPAEDIC RESEARCH AND EDUCATION. THE INSTITUTE CONTINUES TO PURSUE ITS GOALS OF:

- Understanding, enlisting, and enhancing the body’s innate ability to heal.
- Designing and validating surgical and rehabilitation techniques, as well as nonoperative management for osteoarthritis.
- Producing and publishing scientifically validated research in leading medical and scientific journals.

The Year in Review

Dear Friends, We are writing to personally thank you for your tremendous support during this past year. We are pleased and grateful for the advances made as a result of your generosity and excited about progress still to come. We also want to update you about significant changes and exciting news about our research.

The Board voted unanimously at its meeting in December 2009 to change our name to the Steadman Philippon Research Institute (www.sprivail.org). Dr. Philippon's contributions to our research efforts have been considerable since his arrival, to say the least. Thus far, he has produced more than 54 articles and 300 presentations under our auspices. His integrity and leadership capabilities, coupled with his technical innovations in the field of hip arthroscopy, make him an ideal complement to our research organization and to our succession. His dedication to the principles of joint preservation and *keeping people active* matches Dr. Steadman's own philosophy. Most importantly, these two physicians' mutual emphasis on the importance of outcomes-based medicine is paramount in their approach to research.

Since 2004, our focus on knee and shoulder research has widened to include other areas of sports medicine. The Institute's departments of Education/Fellowship, Biomechanics, Basic Science and Imaging, have grown exponentially. Our Clinical Research database (under the direction of Karen Briggs, M.B.A., M.P.H.) has expanded to become the largest in the world for knees, hips and shoulders. We have also begun data collection for spine, foot and ankle, and imaging. Each department is staffed by talented professionals dedicated to conducting research that will improve the practice of orthopaedics worldwide.

Looking back at 2009, our Basic Science department conducted exciting research using stem cells and platelet rich-plasma. Biologics are playing, and will continue to play, an important role in patient care, and we are at the forefront in this important area. Our Imaging Research group has now collected data on over 2,000 patients and we have begun several studies to improve diagnosis using MRI scans. In Education, the current group of Fellows is excellent, our Visiting Scholars program is educating foreign physicians in the latest advancements of care and research, and our Sports Medicine Imaging Radiology Fellow, the first such fellowship in the world, began in August (2010). Guided by our distinguished Scientific Advisory Committee and our commitment to conducting meticulous research, we expect to produce important advancements in orthopaedic care in the coming years.

Over the past three years, we have been especially efficient with the Institute's donations and support, because of the nation's economic downturn, by closely monitoring expenditures. Due to your continued generosity, the support of our corporate friends, and through sound financial management, we were in a position to successfully recruit Robert LaPrade, M.D., Ph.D., from the University of Minnesota, where he was a practicing orthopaedic surgeon, professor, and director of the university's Biomechanics Laboratory.

Dr. LaPrade is an internationally recognized clinical scientist and board-certified sports medicine orthopaedic surgeon who joined the Clinic and the Institute on May 1, 2010, as Director of the Biomechanics Research Laboratory. While an extremely busy clinician known for his outstanding diagnostic and surgical skills, Dr. LaPrade is known for his passion for research and utilizing his findings to improve the ability to diagnose complex knee cases, optimize surgical techniques, and provide better patient outcomes.

With more than 100 scientific manuscripts, 50-plus invited articles and book chapters, and one comprehensive textbook on the knee, he is one of the world's most published researchers in orthopaedics. Dr. LaPrade has special expertise in complex knee disorders that include "back-of-the-knee" injuries, ligament injuries, ACL reconstructions, meniscal transplants, knee osteotomies, and osteoarticular allografts, to name a few.

Your continued support has made it possible not only to secure the services of Dr. LaPrade, but also two members of his research team who were carefully chosen to join him at the Institute. They are Coen Wijdicks, Ph.D., Deputy Director and Senior Staff Scientist and Kyle Jansson, B.S., Research Engineer.

As part of Dr. LaPrade's recruitment process, we committed to a multimillion-dollar expansion of our Biomechanics Research Laboratory facilities, which will include a new motion lab, an *in vitro* biomechanics lab, a robotic area, and an expanded bioskills lab that will be used for teaching. Each area of the new lab will have the most advanced technology available. We will be utilizing our new lab for continued study of all major joints, which will lead to the improvement of care for our patients and the orthopaedic community worldwide.

We are also very pleased and grateful that the Vail Valley Medical Center, our long-term supporter, is partnering with the Institute in this endeavor.

In fulfilling our mission of educating the orthopaedic community and improving care worldwide, we have significant news to report. In May, the largest sports medicine congress ever was held at the recent European Society of Sports Traumatology, Knee Surgery, and Arthroscopy (ESSKA) 14th Congress in Oslo, Norway. At this prestigious congress, Coen Wijdicks, Ph.D., Deputy Director of our Biomechanics Research Laboratory, was presented with the Nicola Foundation Young Researcher Award. The award is given for the best scientific manuscript, in the fields of Knee Surgery, Sports Traumatology and Arthroscopy, by a researcher under 40 years of age.

Also at the Congress, two papers, one by Karen Briggs, M.B.A., M.P.H., Director of Clinical Research, and one by Dr. Wijdicks, were among six finalists for the “Star Papers” out of a total of 1,088 submitted abstracts for the best paper of the ESSKA Congress. We also won the “Best Poster Award” and the “Smith & Nephew Best Paper in Ligaments and Biomechanics Award.” In total, our team made 22 presentations and produced nine posters. Our research studies, presentations and posters are now affecting improvements in orthopaedic care worldwide.

Finally, we are pleased to announce that four individuals have agreed to join our Board of Directors:

Lodewijk de Vink, retired, was formerly Chairman, President, and CEO of Warner Lambert; President of Schering International; Member of the President’s Export Council, and is a member of numerous other boards.

Greg Lewis, president of Greg Lewis Communications, brings a wealth of experience in sports media and communications to the Institute’s Board. Greg, a network sports EMMY winner, conducts business with the sports divisions of NBC, CBS, ESPN/ABC, Fox and Fox Sports, and other media outlets.

Frank Krauser, recently retired as President and CEO of NFL Alumni and CEO of Pro Legends, Inc., a subsidiary that engages in marketing activities to support NFL Alumni projects.

Senenne Philippon, since her arrival in Vail has been vital in attracting a more youthful constituency to the Institute, and she continues to work tirelessly on our events and spreading the word about the mission of the Institute.

On behalf of our board members, researchers and staff, thank you for your interest and past support. Our success—indeed all of our work—is funded by friends like you who step forward to make certain our research continues. We are counting on your continued support of the Steadman Philippon Research Institute. We will keep you updated on our work throughout the year.

Respectfully yours,



J. Richard Steadman, M.D.



J. Michael Egan



Marc J. Philippon, M.D.

A handwritten signature in black ink, appearing to read "Richard Steadman".

J. Richard Steadman, M.D.

A handwritten signature in black ink, appearing to read "Mike Egan".

J. Michael Egan

A handwritten signature in black ink, appearing to read "Marc J. Philippon".

Marc J. Philippon, M.D.

Board of Directors and Officers

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Vail, Colo.

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Marc J. Philippon, M.D.

The Steadman Clinic
Vail, Colo.



J. Richard Steadman, M.D.



Gay L. Steadman



Marc J. Philippon, M.D.



Senenne Philippon



Howard Berkowitz



Robert A. Bourne



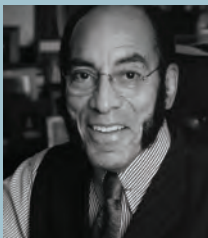
J. Michael Egan



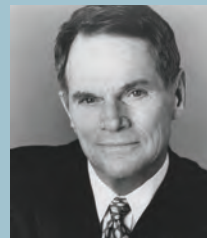
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Stephanie Flinn



Earl G. Graves, Sr.



Ted Hartley



Frank Krauser

Senenne Philippon
Vail, Colo.

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Hazelden Foundation
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Co-Chairman
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Vail, Colo.

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Larry Mullen, Jr.



Cynthia L. Nelson



Mary K. Noyes



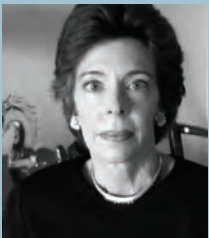
Al Perkins



Cynthia S. Piper



Steven Read



Damaris Skouras



William I. Sterett, M.D.



Stewart Turley



Norm Waite

A Tribute to Jack Kemp (1935-2009)

By Mike Egan



Photo: AP Photo/Stephan Savoia

Our dear friend and Institute Board member, Jack Kemp, passed away in 2009. Jack joined the Board in 1991 at a very critical time for the Institute, and his presence in the early days made an important difference in our Institute's ultimate success.

Jack was a long-time patient at the Steadman Clinic and he epitomized our mission of keeping active people active. He sustained many injuries during his football career, but he never let them slow him down. He found his way to the Steadman Clinic because he wanted to stay active, and his visits here began a tremendous personal and professional relationship.

Before his election to Congress in 1970, Jack played professional football as a quarterback for the San Diego Chargers and Buffalo Bills. He was captain of the Bills and led the team to the American Football League championship in both 1964 and 1965. Jack co-founded the AFL Players Association and was elected president five times. He was also recognized by *Sporting News* as one of the "Top 50 Quarterbacks of All Time" in 2005.

Jack received the Republican Party's nomination for Vice President in 1996 and throughout his political career campaigned for reform in taxes, Social Security, and education. His distinguished public service included positions as co-chair of the Council on Foreign Relations' Russia Task Force,

co-chair of the Lincoln Bicentennial Cabinet, and co-director of Empower America, and he helped form the non-partisan Foundation for the Defense of Democracies.

As a board member of NFL Charities, Jack created and developed a long-term relationship between that organization and the Steadman Philippon Research Institute. He was instrumental in assisting our Institute to receive ten research grants over a period of 18 years. Those grants were directed toward studies of motion analysis, a better understanding of injuries, and return to full activities—research that was carried out in the departments of Basic Science and Biomechanics at the Institute.

Jack's personality was larger than life. Over the years, we all had the opportunity to spend time with Jack, Joanne, and their four children, and those occasions will always remain memorable. Jack was a wonderful

husband, father, and grandfather.

Although many people will remember Jack as a great athlete, he may have been even more active and well known for a life committed to public service. His accomplishments, in addition to the ones already mentioned, are indicative of his remarkable character, his ability, and his dedication to improving the lives of others. He took an intense interest in our research program, how the outcomes of that research affected people, and the strategic direction of the Institute.

All of us will miss Jack deeply as an important Board member, but we already miss him even more as a friend.

Steven Read Uses His Experience, Energy, and Passion to Support the Mission of the Institute.

By Jim Brown, Executive Editor

Here is the prototype of a Steadman Philippon Research Institute Board Member: (1) a person who exemplifies the Institute's mission of keeping active people active; (2) a successful, innovative leader; (3) an individual who is willing to commit time, energy, and resources to building the premier independent sports medicine institute in the world. One more thing: This person would be even more valuable if he or she could bring years of experience on similar boards.

Steven Read, a member of the SPRI Board of Directors for more than a decade, not only represents the prototype, he may well be the prototype. He is Founding Partner of Read Investments, a commercial real estate development corporation in Berkeley, California, and Co-Owner/Co-Chairman of Grocery Outlet, Inc., a retail food store chain in the western states, Hawaii, Texas, and Louisiana. He sits on six boards, all nonprofit, including the University of San Francisco, the United States Ski and Snowboard Foundation, and the Steadman Philippon Research Institute, which he refers to as his most stimulating and one whose fellow members are, he says, overwhelmingly qualified.

INJURY LED TO INVOLVEMENT

Like many of those who support the mission of the Institute, Steven first came into contact with the Steadman Clinic, and later the Steadman Philippon Research Institute, because of an injury. "I had three knee injuries over a period of 15 years," he explains, "and I was fortunate enough to be able to see Richard Steadman the day after my first ski accident. I was one of those aggressive recreational athletes who was able to take advantage of Dr. Steadman's approach to sports medicine before many others. His 'healing response' technique gave Dr. Steadman a competitive advantage because it was putting highly paid athletes back into competition three to five months faster than knee reconstruction procedures. "Later, when I was asked to serve on the Board, accepting the invitation was an easy decision and an honor," he says. "The approach of the Institute was something with which I was very familiar, that is, using evidence-based medicine to maintain wellness, extend the length of a person's physically active life, and enhance physical and mental performance."

A GOOD FIT

Steven is a near-perfect match for the work of the Board in many other ways. He began skiing as a toddler and he was a scholarship athlete on three NCAA championship ski teams at the University of Utah. He also participates in road biking, he races vintage cars, he plays golf, and he enjoys fly-fishing. Did we mention that he believes in staying active?

"I grew up in a family that encouraged athletics," he says. "Sports taught me the values of self-discipline and preparation — make that over-preparation."

Read embraces the theme described in Malcolm Gladwell's *Outliers: 10,000 Hours* and applies it to his work and to the work of the Institute. "It takes 10,000 hours of preparation and experience for one hour — or sometimes, one minute — of execution," says Steven Read. "That level of dedication and mastery of intuitive skills are what Steadman Philippon doctors and researchers must possess to develop creative and ground-breaking solutions to orthopaedic care."

His family apparently also taught him the values of long-term commitment and priorities. He has been married to his "kindergarten sweetheart," Mary Ann, for 40 years, has three children and six grandchildren. You can ask him about his business, but he would prefer to tell you a story about someone in his family.

THE BUSINESS PART OF BUILDING

Although his business and sports background are impressive, perhaps his most important contribution to the Institute comes from his experience as a board member at other institutions. At Duke University, he was instrumental in identifying and funding more than \$900,000,000 of building projects. In a similar capacity on the board of Fine Arts Museums of San Francisco, he was in charge of a \$200,000,000 project that resulted in the 2005 re-building of the M. H. de Young Memorial Museum. The museum



Steven Read driving at the 24 hours of Le Mans.

is now considered one of the most unique architectural structures in the world.

GIVE BEFORE YOU GET

"Life needs to honor those who 'give' before they 'get.' The Institute promotes this philosophy of giving," says Read. "This belief is reflected through its practices, research, publications, and especially by sharing its knowledge with the world's medical community.

"Once you are executing," says Read, "a lot of things in life have to be intuitive. Preparation and experience allow you to make quick, well-informed decisions. At the end of the day, you are steering with your accelerator, not looking into the rear-view mirror.

"The Board is encouraged to, in the same way, contribute its work and wisdom to advise the Institute through its many years of diverse cumulative experience to maintain the Institute's leadership in research-based orthopaedics."

ALIGNMENT IS THE KEY

Steven Read is an example — perhaps a prototype — of a fast-moving, give-before-you-get leader who shares his talent and passion with a research organization going in the same direction. He calls it alignment — like-minded people sharing the same vision, making the same commitment, and working together to help people maintain a level of physical and mental performance ingrained into their lifestyle.

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.

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

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

John A. Feagin, M.D.

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

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

Director
Imaging Research
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Vail, Colo.
and
National Orthopaedic Imaging Associates
California Advanced Imaging Center
Atherton, Calif.

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

Assistant Professor of 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
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The Steadman Philippon Research Institute
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C. Wayne McIlwraith, D.V.M., Ph.D.

Director
Orthopaedic Research Center and
Orthopaedic Bioengineering Research
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Peter J. Millett, M.D., M.Sc.

The Steadman Clinic
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The Steadman Clinic
Vail, Colo.

William G. Rodkey, D.V.M.

Chief Scientific Officer
Director of Basic Science Research
The Steadman Philippon Research Institute
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Theodore F. Schlegel, M.D.

The Steadman Hawkins Clinic
Denver, Colo.

J. Richard Steadman, M.D.

The Steadman Clinic
Vail, Colo.

William I. Sterett, M.D.

The Steadman Clinic
Vail, Colo.

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

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



The Importance of Evidence-Based Medicine

By Mike Egan



(AP Photo/Rob Carr)

New York Yankees' Alex Rodriguez hits a three-run home run during the first inning of a baseball game against the Baltimore Orioles, Friday, May 8, 2009, in Baltimore. Rodriguez joined the team for the first time after recovering from hip surgery by Dr. Philippon.

The Yankees won the 2009 World Series principally due to the tremendous comeback of Alex Rodriguez. This ended a storybook season for the Yankees and their inaugural year in their new home in the Bronx.

But the 2009 season didn't start out nearly as bright as the finish. At the start of the year, the Yankees were getting ready to play their first season in their new stadium and their superstar, Alex Rodriguez was suffering from a damaged hip.

Marc Philippon, M.D. was contacted and asked for a diagnosis. "I was able to make the diagnosis of Alex's condition and propose a plan which included surgery and

rehab, based on our extensive database of evidence-based research, which allowed me to accurately predict Alex's return to the team." Dr Philippon knew of Alex's reputation as a very hard worker and was confident Alex would carry out his rehab plan diligently. "Alex has a tremendous work ethic, which together with a well thought out surgical plan, made his comeback a reality."

We asked Alex to comment on his experience. "Dr Philippon and I formed a close bond. He's the best doctor in the world for sports related hip injuries and I trust his abilities and judgment." Alex learned more about the Steadman Philippon Research Institute during his treatment. "I've learned about how the people in Vail are dedicated

to improving sports medicine, including the scientists, researchers, staff and others who support Dr Philippon and give him his ability to accurately diagnose and carry out his therapy. I recognize what Dr Philippon's research and innovation has done for me and is doing for others, and I'm grateful."

Alex continued to break records in 2010, including becoming the youngest player to hit 600 home runs. His future looks bright. Alex and the Yankees knew of Dr Philippon's reputation as an outstanding surgeon. They have learned the importance of evidence-based medicine and its direct affect on his care, and we affirmed the importance of diligence in rehab through Alex.

Ken Griffin is at the Top of List of Grateful Patients, Fervent Supporters, and “First-Party” Beneficiaries of the Institute’s Research

By Jim Brown, Executive Editor

Seven years ago, Kenneth C. Griffin had his first experience with Dr. Steadman, the Clinic, and the Research Institute. A lifetime of athletics had left him with chronic pain and limited motion in his left knee. Barely in his 30s, activities that he had long enjoyed, such as tennis, racquetball and soccer, were becoming a challenge.

“I had seen five specialists, at some of the top medical institutions in the country, and heard five different strategies for treatment. I worried that I would never be able to enjoy an active lifestyle again,” said Mr. Griffin. As a last resort, Mr. Griffin decided to go to the Clinic after hearing about it from a close friend whose daughter had been successfully treated by Dr. Steadman.

EARLY START TOWARD THE TOP

Growing up in Texas and Florida, Mr. Griffin couldn’t help but be obsessed with sports. When he was 6 years old, Mr. Griffin first played team soccer and loved the competitive challenge that the sport presented. “Soccer requires tremendous athleticism, as well as the ability to anticipate the opposing team’s next move,” Mr. Griffin said. “From playing soccer at such a young age, I learned that I truly loved the thrill of competitive sports.”

Mr. Griffin has channeled his competitive spirit into business. During his sophomore year at Harvard, Mr. Griffin started investing in convertible bonds and quickly developed an impressive track record. A year after graduation, Mr. Griffin launched Citadel LLC with \$4.6 million in assets under management. Now with more than \$11 billion in assets, Mr. Griffin has built Citadel into one of the most successful financial institutions in the world.

THE TRAIL TO VAIL

Even as he was aggressively building his business, Mr. Griffin still found time to play in a variety of men’s soccer leagues. It was a showdown between the top two teams that triggered the injury that first introduced him to the Institute. “The game was tied at zero. Midway through the game, I got a long ball pass from the back of our field to right near the opposing team’s goal box. Running in an all-out sprint, I slammed right into the last defender and just went down.” At that moment, Mr. Griffin knew he had been seriously injured. “I was just happy I could move my toes,” he said.

MEETING DR. STEADMAN

After enduring three surgeries and still facing limited mobility, Mr. Griffin remained unwilling to give up soccer and sought out Dr. Steadman for another opinion. At their very first meeting, Mr. Griffin was impressed by Dr. Steadman’s extraordinary professionalism and the depth of his diagnostic analysis. Dr. Steadman identified the underlying problem and had a well-reasoned treatment solution. “I had a tremendous amount of scar tissue limiting joint mobility and putting me at risk for arthritis later in life,” said Mr. Griffin. “Dr. Steadman recommended a treatment path that would restore motion and help to delay or avoid possible arthritis.” Harnessing research conducted at the Institute, Dr. Steadman was able to recommend an innovative surgery to remove the scar tissue.

Beyond the diagnosis, Mr. Griffin was impressed with Dr. Steadman’s focus on ensuring a first-rate patient experience. “He immediately makes a connection with you, he listens and explains the reality of the situation,” Mr. Griffin said. “I appreciated his clear emphasis on research and data analysis. He surrounds himself with a great

team of medical professionals who have access to cutting edge surgical and diagnostic tools. The Institute is a true leader in knee injury research.”

Mr. Griffin’s surgery has been a resounding success. The procedure, part of what is widely known as “The Package,” was pioneered at the Institute. Because of the fellowship program, a network of doctors around the world is now getting trained in practices first initiated at the Institute. “I am profoundly grateful to Dr. Steadman and his staff for restoring my mobility and allowing me to participate in sports pain-free. Since the injury, my knee has never felt better.”

Following post-surgery rehabilitation, Mr. Griffin is now a four-to-six times a week exerciser who goes on 50-mile bike rides and can then play a couple sets of tennis with friends. Most importantly, he is able to chase his young son around the park without experiencing any discomfort. Mr. Griffin loves being outdoors and participating in team sports. “Being physically fit is a huge advantage for anyone involved in a high intensity occupation,” said Mr. Griffin. “It is an outlet to manage stress and increases physical and mental stamina.”

Mr. Griffin is proud to be a supporter of Dr. Steadman and the Institute. He recognizes how important it is to support medical research and to provide the Institute with the financial resources to innovate. “I am thrilled to support Dr. Steadman and the Institute’s work. I think it is vital to support his research efforts as one of the many patients who have benefited personally from the generosity of other donors long before I became acquainted with the Institute.”

Mr. Griffin has always recognized the importance of giving back to his community. He and his wife recently launched The



Kenneth and Anne Griffin Foundation to support their philanthropic endeavors. He also serves as the Vice Chairman of the Chicago Public Education Fund, and is a member of the Board of Trustees for the Art Institute of Chicago and the Museum of Contemporary Art in Chicago.

“WHAT I WANT PEOPLE TO KNOW IS”

“The work of Dr. Steadman, Dr. Philippon, and the surgeons, researchers, and other professionals at the Institute is unparalleled,” said Mr. Griffin. “While there are many outstanding doctors in the world, few have the same passion for the research of medicine as for the practice of medicine.

The physicians at Steadman Philippon have both.”

Finally, in closing, Mr. Griffin added that “we all take our health for granted until it is in jeopardy. Anyone who’s torn an ACL, ripped a meniscus, or who has joints that don’t work knows that Dr. Steadman and his colleagues are working feverishly to help all of us have better outcomes after catastrophic injuries. I am thankful that I have had the opportunity to support the research of Dr. Steadman and his team, both for my personal benefit, and for everyone who appreciates the joys of an active lifestyle.”

FRIENDS OF THE INSTITUTE



In 2009, we received 1,109 separate gifts and corporate support from 837 individuals, foundations, and corporations. This combined support, including special events, amounted to \$4,333,549. The Institute is grateful for this support and to those who have entrusted us with their charitable giving. We are especially pleased to honor the following individuals, foundations, and corporations that have provided this support. Their gifts and partnership demonstrate a commitment to keep people active through innovative programs in medical research and education. Without this support, our work could not take place.

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

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

Mr. Kenneth C. Griffin

Össur Americas, Inc.

Smith & Nephew Endoscopy

Dr. and Mrs. J. Richard Steadman

Vail Valley Medical Center



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

Instituto Braxil de Tecnologias da Saúde

Bioskills Research and Education Grant, sponsored by Smith & Nephew

HALL OF FAME

The Institute is grateful to the following individuals, corporations, and foundations for their support of the Institute in 2009 at a level of \$50,000 or more. Their vision ensures the advancement of evidenced-based medical 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:

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| Mr. and Mrs. Trevor Gray | Dr. and Mrs. Marc Philippon | |

GOLD MEDAL CONTRIBUTORS

We are grateful to the following individuals, foundations, and corporations that contributed \$20,000-\$49,999 to the Institute in 2009. Their continued generosity and commitment helps fund research to enhance cartilage healing. This potentially innovative treatment will help preserve the body's own joints and tissues by leading to improved quality and quantity of "repair" cartilage produced by the microfracture technique, a procedure impacting multitudes worldwide.

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SILVER MEDAL CONTRIBUTORS

Silver Medal donors contribute \$5,000-\$19,999 annually to the Institute. Their support makes it possible to fund research to determine the effectiveness of training programs to prevent arthritis, identify those who are most at risk for arthritis, and provide a basic foundation to improve postsurgical rehabilitation programs, thus improving the long-term success of surgical procedures. We extend our deep appreciation to the following individuals for their generous support in 2009:

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| Howard Head Sports Medicine Center | Mr. John B. Sender Mr. Michael Byram and Mrs. Ann B. Smead |



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:

- Mr. and Mrs. Robert M. Fisher**
- Ms. Margo Garms**
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- Mr. and Mrs. John McMurtry**
- Mr. and Mrs. Edward J. Osmers**
- Mr. Al Perkins**
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Chairs Support Institute Work

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 179 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 2009, six chairs provided important funding for the Institute's research and educational mission. We are most grateful for the support from the following:

Mr. and Mrs. Lawrence Flinn

The Gustafson Family Foundation

Mr. and Mrs. John W. Jordan

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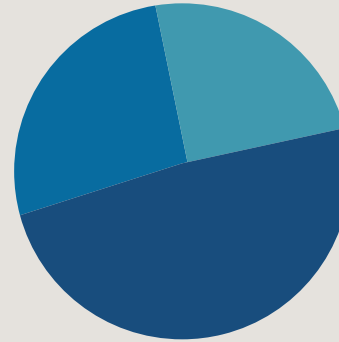
Medical research and education programs are supported by gifts to the Institute's annual fund. The Bronze Medal level was created to recognize those patients and their families, trustees, staff, and foundations who contribute \$10-\$4,999 annually to the Institute.

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 success. We thank the following for their support in 2009:

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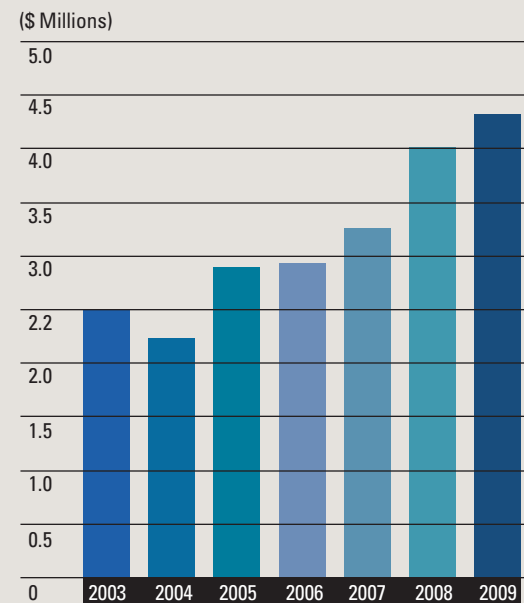
2009 Revenues



Increasing Generosity

Support in 2009 took place in the context of a continuing world economic crisis. Individuals, corporations and foundations contributed \$4,333,549 in 2009.

Seven years of support.





Fellowship Benefactors

Fellowship Benefactors fund the research of one Fellow for one year at a level of \$10,000. This is a fully tax-deductible contribution that provides an opportunity for the benefactor to participate in a philanthropic endeavor by not only making a financial contribution to the educational and research year but also to get to know the designated Fellow. 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 for their generous support:

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2009 Steadman Golf Classic, Presented by RE/MAX International, August 20.

The Institute was again selected by RE/MAX International, a global real estate firm, to again hold the sixth annual Golf Classic at the 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.

More than 260 charities have raised 47 million dollars at the Sanctuary to benefit the constituents they serve. Renowned course architect Jim Engh, Golf Digest's first-ever "Architect of the Year" in 2003, 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 Dave and Gail Liniger, owners and cofounders of RE/MAX International, 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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Sensational Night to Remember

Master chef Wolfgang Puck's Spago in the Rocky Mountain setting of the Ritz Carlton, Bachelor Gulch, was the setting for the **Night to Remember** event on July 24. This spectacular evening, featuring the wines of Duckhorn Wine Company, benefitted the orthopaedic research and educational programs of the Steadman Philippon Research Institute.

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Lindsey Vonn: On a Mission to Conquer the World

By Jim Brown, Executive Editor

Lindsey Vonn, professional skier and a former Steadman Clinic patient, has a global view of things, as in *Lindsey Vonn: Olympian*, winner of two World Cup overall titles, four World Championship medals, two-time gold medalist already in 2009, and winner of a World Super G title. And that's just the short list.

At 24, Lindsey has been called the most successful American skier in history, but thanks to her great talent, competitive nature, and the cutting-edge surgical techniques developed at the Institute, she wants more and is likely to get it.

When your day job is to fly down the side of a mountain on skis at 60 miles per hour without a trapeze artist's safety net or a NASCAR roll bar, getting health insurance can be a challenge. A sprained knee here, another knee injury there, a broken hip, and a severed tendon in her hand can make for high premiums or high deductibles—take your pick. At one point, Lindsey had to ski with her hand duct-taped to her ski pole (one of the few high-tech procedures not developed or refined at the Institute) because she couldn't grip it tight enough without help.

SUPER G CRASH IN AUSTRIA

Downhill skiers know about injuries, so when Lindsey fell—make that crashed—during a 2006 Super G training run in Austria, she knew something bad had happened. "I was going real fast and something caught the edge of my ski. I did a few somersaults and hit my left knee 'kind of funny,'" she recalls. "I knew it was bad right away."

She had considerable pain, swelling, bruising, and an MRI that showed a probable small fracture. The first race of the season was coming up, so she took a week off and kept skiing. That's what skiers do, and Lindsey kept doing it for the next few months.

"Toward the end of the season, I went to Vail to see Steadman Clinic orthopaedic surgeon Dr. William Sterett," says Lindsey. "I had suffered an injury to my other knee when I was 14, and he was my doctor then. He found cartilage damage and recommended surgery." Dr. Sterett is a partner in the Clinic and a former Fellow sponsored by the Institute. During his Fellowship, Dr. Sterett learned many of the innovative techniques created by Dr. Steadman and validated by the Institute.

The procedure performed by Dr. Sterett is called "The Package," which is a series of arthroscopic procedures conducted during one operation designed to treat pre-arthritis and arthritic patients and to preserve joints. It was invented by Dr. Steadman and has been validated through several years of research at the Institute.

"In the American and international skiing communities," says Lindsey, "it's just known that Steadman Clinic is the place to go if you have a knee injury. That's where my mom took me when I was a kid. Dr. Sterett took good care of me then and he's been my doctor ever since. He's the best around and he's my guy. I trust him."

"The surgery didn't take long," she says. "When I woke up, I felt like a million dollars, like I had been sleeping several days. My husband, a nurse, and the anesthesiologist were there right after the operation, and Dr. Sterett came in shortly to check on me."

Lindsey recalls that, at first, the rehab program was tough. "The knee was swollen and moving it through a range of motion was difficult. I did rehab at the Howard Head facility three-four hours a day, then continued icing my knee and doing exercises at home (Lindsey now calls Vail, Colorado, home). When they repair cartilage, you have to give it time to heal. If not, you could have even more damage."

THE STEADMAN CLINIC EXPERIENCE

"The whole procedure and rehab program worked out great. I got stronger each week. By the time I got back on the snow, it felt great. No pain and I haven't had any problems since. I'm 100 percent back. Even the three small scars have faded away. The procedures performed by Dr. Sterett allowed me to continue doing what I do, and now I have healthy knees."

"I've been in other hospitals, but in my opinion, none of them take care of you like they do at Steadman Clinic," says Lindsey. "And not just because I am a skier. I actually like to go back and visit with the staff. My surgery was easy because everyone made me feel so comfortable. That's not normal."



Photo: AP Photo/Alessandro Trovati

"Somewhere else they might have told me to either deal with the pain or stop skiing," says Lindsey. "But because of the research conducted at the Institute and the training and expertise of Dr. Sterett, I can do whatever I want to do."

What she wants to do now is to conquer the skiing world. Watch for her when World Cup competition starts this fall.

U.S. OLYMPIC SKIERS SET RECORD FOR MEDALS WON

Athletes Benefit from Institute Research

February brought us the 2010 Winter Olympics, where three great Americans who have directly benefited from Institute research claimed seven out of eight Olympic medals for the United States in alpine skiing. Two orthopaedic specialists from SPRI, Drs. Bill Sterett and Tom Hackett, were volunteering as team physicians when Lindsey Vonn, a former patient of Dr. Sterett's, won a Gold in women's Downhill and a Bronze in women's Super G.

Julia Mancuso, who has been treated by pioneering hip specialist Dr. Philippon, brought home Silver medals in both women's Downhill and women's Super Combined.

And Bode Miller, whose career was saved by Dr. Steadman in 2001 when his torn ACL underwent "healing response," captured Gold in men's Super Combined, Silver in men's Super G, and Bronze in men's Downhill.

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Corporate support helps fund our Institute's research and education programs in Vail, Colorado, and at six university sites. Corporate funding has increased as we have continued to deliver efficiencies in overhead, allowing us to direct more dollars into research. This year, 68 cents of every dollar raised goes into research. The Institute is grateful for the generous support of our corporate donors. In 2009, we received \$1,057,806 in corporate support. This work will benefit patients and physicians for generations to come.

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Darius Rucker is a Star on the Stage, on the Golf Course, and in the Community

“By the time I got to Dr. Steadman and the Steadman Clinic, my knee was a mess,” recalls Darius Rucker. “I had a history of bad knees, mostly caused by wear and tear, but this time it was worse. I couldn’t straighten my leg — couldn’t get it past 45 degrees.”

Darius Rucker is a Capitol Records Nashville award-winning country music star. Earlier in his career he skyrocketed to fame as the lead singer for the rock band Hootie & the Blowfish. Darius was given the 2010 Country Music Association New Country Artist of the Year Award (formerly called the Horizon Award), and his albums and singles have reached the top of all three national music charts. In 2008, his “Don’t Think I Don’t Think About It” became a number one single. But his knee problems were slowing Darius down both on the stage and off. “My knee bothered me, but you try not to let something like that stop you,” he says. “At one point, I had a staph infection that kept me in the hospital for two weeks. A torn meniscus, several operations, three surgeries to clean out the infection, and all the scar tissue put me in a lot of pain.”

“WHEN YOU HAVE A CHANCE TO SEE . . .”

“A friend of mine, Al Perkins (a Steadman Philippon Research Institute Board Member), told me I needed to see Dr. Richard Steadman,” Darius continues. “I knew who he was. Anybody who follows sports knows who he is, but I didn’t know him personally. Al arranged an appointment and I went to Vail.

“I guess I could have gone somewhere else, but when you have a chance to see Dr. Steadman, you’d be a fool not to do it,” says Darius. “Once I met him, I felt like everything

was going to be okay. When he walked into the room, the thing that struck me instantly was how laid back and real he was. After we had talked for two minutes, I felt like he had been my doctor for 12 years. It was like he didn’t have another patient to see that day. I thought that was pretty cool.”

Dr. Steadman and his colleagues “fixed” Darius’s left knee, cleaning out loose objects, smoothing frayed tissue, and repairing areas damaged by scar tissue — using techniques either pioneered or refined by research conducted at the Institute and put into practice every day by the team of physicians at the Steadman Clinic.

STRONGER THAN EVER

Darius, his music, and his knees are stronger than ever. His schedule is packed with dates at some of the most famous music venues in the world. In July, he performed for the Institute’s annual summer fundraiser at the Gerald Ford Amphitheater in Vail, Colorado.

“I told Al I wanted to play a show for the Institute,” says Darius. “I’m busy, but not too busy to do something that might help the Clinic and the Research Institute.”

He is also back on the golf course. His knee feels fine, he plays five days a week, and he has a seven handicap, although he grew up in South Carolina wanting to be— believe it or not — a professional hockey player.

His charity event, “Monday After the Masters,” is in its 15th year. In April, a sold-out crowd of 6,000 fans watched Darius



and his friends host scores of celebrity athletes and entertainers at The Dye Club at Barefoot Resort & Golf in South Carolina. The event has donated more than 4.5 million dollars to the Hootie & the Blowfish Foundation, which supports the educational needs of South Carolina and the South Carolina Junior Golf Foundation.

“As a former patient,” adds Darius, “I try to keep up with sports medicine, and what they are doing at Steadman Philippon is always on the cutting-edge of orthopaedic technology and surgery. I respect everyone associated with the Steadman Clinic and the Steadman Philippon Research Institute, and I support what they do.”

THE YEAR IN RESEARCH AND EDUCATION



Basic Science Research

William G. Rodkey, D.V.M., Director of Basic Science Research, and Chief Scientific Officer

The purpose of our Basic Science 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) new 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 2009, we collaborated with various educational institutions, predominantly Colorado State University. 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 is an exciting one that has gained global attention. There are many new and innovative techniques under investigation by scientists around the world. One of the broad goals of this work can be stated simply as joint preservation. In 2009 we focused our efforts almost exclusively on regeneration of an improved tissue for resurfacing of articular cartilage (chondral) defects that typically lead to degenerative osteoarthritis. We have been working in the promising area of adult autogenous (one's own) mesenchymal stem cell (MSCs) therapy in collaboration with Drs. Wayne McIlwraith and David Frisbie at Colorado State University. We have now completed our initial study, and we have enough important data to take this project to the next level.

The following provides some important background information and a brief summary of our most recent findings. This work is ongoing, and the encouraging results presented here will allow us to continue to focus on this work in the coming years.

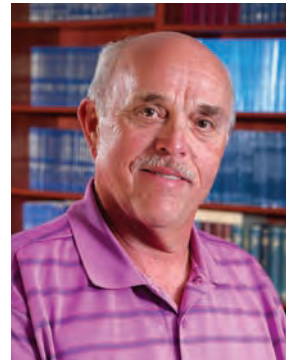
Osteoarthritis (OA) is a debilitating and progressive disease characterized by the deterioration of articular cartilage accompanied by changes in the subchondral (below the cartilage) bone and soft tissues of the joint. Traumatic injury to joints is also often associated with acute damage to the articular 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 often is OA, and the ultimate outcome may necessitate total joint replacement with metal and plastic.

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 71 million Americans (15 percent to 20 percent of the population) will have some form of arthritis, including degenerative arthritis secondary to injury to the articular cartilage surfaces of the joints. Osteoarthritis is the most significant cause of disability in the United States and Canada, moving ahead of low back pain and heart disease. By the year 2020, more than 60

million Americans and six million Canadians will be affected by some degree of osteoarthritis of just the knee. OA of other joints will raise this number significantly. The economic impact is enormous. Osteoarthritis alone will consume more than \$89 billion of direct and indirect costs to the American public in 2010. The intangibles of this terrible disease include the chronic pain, disability, and psychological distress on the individual and 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.

We have previously proven that arthroscopic subchondral bone plate microfracture is a successful method to promote adequate cartilage healing. "Microfracture" consists of making small perforations in the subchondral bone plate using a bone awl to access the cells and the growth factors present in the underlying bone marrow. The technique relies on the body's own cell population, and healing proteins appear in the marrow to promote healing. This allows us to avoid 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 80 percent to 85 percent of patients over time. While such results are very positive, our goal is to achieve even better outcomes.

Our major effort this year was completion of the initial study involving the use of adult autogenous (one's own) mesenchymal stem cells that 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. Collaboration with Colorado State University has led to a relatively straightforward and inexpensive way to produce these stem cells. Our premise was that when added to the microfracture site, these



One Step Closer: Collaborative Effort May Lead to Patients' Own Stem Cells Producing Stronger Cartilage Tissue

By Jim Brown, Executive Editor

"Our goal was to enhance the microfracture procedure and to see if combining microfracture with an infusion of the body's own stem cells would produce higher-quality articular cartilage tissue than microfracture alone," says William Rodkey, D.V.M., the Steadman Philippon Research Institute's Chief Scientific Officer. "The first phase of this research has been completed, the findings were positive, and now we're talking with the FDA regarding the next step."

Dr. Rodkey is speaking about a research project that involves scientists, physicians, veterinarians, and research specialists from both the Institute and Colorado State University. "It is very much a collaborative effort," he explains. "Dr. Steadman (who pioneered the microfracture procedure) and I are focused on the human patient point of view, while Wayne McIlwraith, D.V.M., Ph.D., Director of the Orthopaedic Research Center at Colorado State, and his colleagues are looking more at veterinary and equine applications. The human-horse interaction is very strong, and both sides of the equation potentially stand to benefit immensely."

NOT TO BE CONFUSED WITH EMBRYONIC STEM CELLS

"This study is not to be confused with embryonic stem cells," Rodkey emphasizes. "What we are doing is taking 'bone marrow-derived, culture-expanded' mesenchymal stem cells (that will come from the patient's own body) and injecting them back into the body to augment the microfracture procedure. This is being done with equine subjects at Colorado State and is resulting in articular cartilage that is of higher quality, firmer, and seemingly of greater durability than that which is produced following microfracture alone. We anticipate that a secondary benefit will be to speed up the healing process."

He again stresses the point that this is not a person-to-person procedure. It is taking one's own stem cells, which have the amazing ability to become different types of body tissue, expanding them for 3-4 weeks in a laboratory environment, and then re-injecting them into that person's body. Dr. Rodkey also points out that the Steadman Philippon Research Institute, working collaboratively with the Orthopaedic Research Center at Colorado State, is among the few research facilities in the world that is using this approach to look at stem cells specifically as they apply to articular cartilage — the kind that covers the surface of the bones in the knee joint.

WHAT'S NEXT?

Drs. Rodkey and Steadman feel strongly that with the data in hand, the Institute is ready to design human studies and trials. "That could possibly happen within the next year," he says, "but communication with the FDA moves at a 'glacial pace' and cannot be hurried along."

In the meantime, the physicians and scientists at the Institute continue to work on techniques of this study to determine whether there are even better ways to enhance the articular cartilage resurfacing process. One immediate objective is to investigate a technique being developed in Malaysia that extracts stem cells from circulating blood. If it works, bone marrow samples would not be needed to extract stem cells.

"The take-home message is that we had this idea, we designed the study collaboratively with Drs. McIlwraith and Frisbie, we carried it out working together at the Orthopaedic Research Center, and our findings were positive," Dr. Rodkey concludes. "Now we are pressing forward for eventual human use, and the Institute will need funding and resources to carry out whatever the FDA tells us that we have to do."

stem cells would enhance the speed and intensity of the cartilage resurfacing process. If enhanced healing could be proven, it is likely that the rehabilitation protocol could be accelerated, thus minimizing discomfort, lost time away from work or sports, and overall financial costs. Another goal of such treatment is to prevent, or at least minimize, degenerative osteoarthritis after chondral injury.

The hypothesis of this study was that the combined effects of intra-articular injection of autogenous bone marrow derived MSCs with microfracture would promote superior healing in full-thickness defects compared to microfractured defects alone. Furthermore, the healing with the MSCs would prove superior to that observed in our earlier studies. In other words, do bone marrow-derived mesenchymal stem cells enhance the cartilage repair process when used in conjunction with the microfracture procedure?

This study was carried out in horses in conjunction with our collaborators at Colorado State University. Full-thickness cartilage lesions were made in each knee (stifle) joint and then microfractured in a standard manner. At the same time, bone marrow aspirates were obtained, MSCs were isolated, and the MSCs were expanded in culture for the next four weeks. After four weeks, randomly and in a fashion not known to the investigators, one joint received an injection of the expanded MSCs while the opposite joint received a placebo control. Six months later, relook arthroscopy was performed on all of the joints, and photographic documentation of the joints was carried out. All of the tissue from each joint was harvested at twelve months. Arthroscopic and gross evaluation confirmed a significant increase in repair tissue firmness and a trend for better overall repair tissue quality (cumulative score of all arthroscopic and gross grading criteria) in MSC treated joints at one year. Laboratory analysis demonstrated significantly greater levels of aggrecan, one of the main building blocks of articular cartilage, in repair tissue associated with MSC-treatment. There

were no other significant treatment effects. These positive findings also lead us to speculate that the new tissue that forms might be even more durable than the repair tissue that forms with the microfracture procedure alone, that is now in use.

Further studies are necessary to help us determine whether the findings persist and support continued improvement over time. We are also in discussions with the FDA about starting a human clinical trial using these techniques. We cannot predict the outcomes of those discussions with the FDA, but we are hopeful that human studies are in the not too distant future. Another approach we plan to pursue in the future is the isolation of stem cells from peripheral (circulating) blood. To date, this technique has not been used in human clinical patients in the United States.

Another study started late in 2009 and now in progress involves the use of platelet rich plasma, or PRP, that is made from the patient's own blood. PRP has been used to treat injured tendons and other soft tissues, but we believe that PRP, with or without the patient's own stem cells mentioned above, may greatly enhance the success of microfracture and other joint resurfacing procedures. We hope to report those findings next year.

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 Basic Science Research group and the Steadman Philippon Research Institute.



Karen Briggs: Putting the Evidence into Outcomes-Based Medicine

By Jim Brown, Executive Editor

In 1993 Karen Briggs, already a respected medical researcher at the University of Colorado Medical School in Denver, came to Vail to ski. While she was here, she saw an ad for a research position at the Steadman-Hawkins Research Foundation.

Three things motivated her to apply for the job. She was ready to move out of the city (Denver), she had family close to Vail, and she had been told that the Foundation (now the Institute) was a special place to work. So she applied for the job, interviewed for it, and got it.

Sixteen years later, she is Karen Briggs, M.B.A., M.P.H., Director of Clinical Research. "I was hired to do two things: work on validating the outcomes of the healing response and establish a database that would contain comprehensive information about every procedure done at the Steadman Clinic."

Now, the healing response, an arthroscopic procedure used to help reattach a ligament in the knee back to the bone, has not only been validated, it is performed around the world for the treatment of anterior cruciate ligament (ACL) injuries. And the database, which didn't exist when Karen arrived, now has approximately 20 million data points — pieces of information — on the knee, hip, shoulder, and spine.

"This information provides a tool to understand the patient's perspective and our surgical outcomes," explains Mike Egan, the Institute's Chief Executive Officer, "and is the key to our research. We study how patients recover from treatment subjectively, based on the patient's assessment of improved function and quality of life and objectively through our surgical and postoperative data."

The database is arguably the most comprehensive collection of orthopedic medical evidence in the world and it grows daily, if not by the hour or minute. The term, evidence-based medicine, has recently become a buzzword in the medical community,

but the database at the Institute began to document outcomes almost two decades ago.

Two questions for Karen: Are other institutions trying to imitate the kind of database established at the Institute, and will they ever catch up? "Yes, they are trying, and no, they won't catch up," says Briggs.

HOW IT WORKS

"We have four fulltime research associates, four interns, and, at any given time, up to two Steadman Philippon Visiting Research Scholars in the Department of Clinical Research," Karen explains. "The interns help collect data on every patient who is treated at the Clinic. Patients get a four-page form, as well as follow-up questions regarding their condition, treatment, and results up to 15 years after a procedure at the Clinic. When the forms are completed, they are scanned, and entered into the database. The questionnaires are reviewed by our Internal Review Board to protect our patients. The data we collect never leaves this building.

"At the same time, our physicians complete forms detailing what they did with each patient. Their forms are very descriptive — as many as 420 data points on a single procedure. For example, if surgery is performed to repair a torn meniscus, we would not only know which knee, but whether it was on the medial or lateral side, (inside or outside), exactly what was done, etc.

"When a doctor or fellow wants to begin a research project, that person can work on our server or we can give them an overview of what the database contains, then run specific searches to produce the information they need to complete the study and prepare a manuscript," says Briggs. "It is very much a joint effort between staff and physicians. The doctors come up with most of the ideas and details, and we do most of the analysis of the data that validates their procedures. Our goal is to provide service to physicians. We consider ourselves to be a service organization as much as we are a research unit.



"Research breeds more research," says Karen. "For every project you do, five others develop." She has trouble leaving her work at the office. In fact, she keeps a notebook on her bed stand for those times during the night when she wakes up with another idea for a research project.

Once the research has been completed, it still has to be written for publication. Karen writes many, if not most, of the papers in conjunction with the Institute's scientists and physicians. "I do that at night, at home, on a PC. We have a person in the office who checks for grammar and sentence structure, then the paper goes to Dr. Rodkey, our Chief Scientific Officer and Director of Basic Science, for his review. And finally, the paper will go back to the doctor who initiated the project."

In spite of the success of the Clinical Research department, there are limitations and challenges. "We have to have research questions for the database to answer. Sometimes I worry that we'll run out of questions. But each year we get six of the brightest Fellows in sports medicine to bring new questions. Getting people to respond will always be a problem. If they are doing okay, they may not want to take time to fill out the questionnaires. If they are not doing well, they let us know about it, which we use as feedback to the physicians so they can try to help those people not doing well.

But our success depends on the patient's willingness to participate in the process. We want them to know that their responses can affect the lives of other people."

WHAT HAPPENS WHEN OUTCOMES ARE PUBLISHED?

"When we do a study at the Institute and the results are presented at a meeting and published in professional literature," says Briggs, "it can literally change the way medicine is practiced.

"For example, microfracture has become the procedure of choice because of results validated at Steadman Philippon. And before 1998, physicians seldom performed surgery on the ACL in people over 40. They were just told to limit activities that would stress the knee joint. Dr. Steadman showed them the results of studies in which his patients did very well after ACL surgery, and now older adults can stay active for a lifetime.

"Another example is the treatment of a hip condition called femoroacetabular impingement. Treatment refined at the Institute moved new techniques forward so that doctors and patients began to accept the procedure as a standard for care. Even more importantly, when we published the results of the procedure, insurance companies began to recognize the value of these new treatments and included them in their coverage.

"One more example: We have just validated and published normal values that will allow other physicians to document the outcomes of their knee patients by using a one-page form. With this form, every doctor should know how his or her patients are doing. This document will give them a method that is simple and cost-effective."

EGAN ON BRIGGS AND THE FUTURE OF OUTCOMES-BASED MEDICINE

"Karen Briggs is an outstanding example of talented people who have built the Steadman Philippon Research Institute into a world-class research organization,"

says Egan. "She has almost single-handedly developed the Department of Clinical Research into the leading sports medicine clinical research group, one that is vital in shaping our future. Karen has been recognized worldwide in orthopaedics for validating clinical research in sports medicine and she speaks at society conferences all over the world regarding her findings. Her passion has also influenced key employees to continue their studies and to earn a master's degree in Public Health (M.P.H.), which is underwritten by our Institute.

"Our Clinical Research group," continues Egan, "now manages millions of data points and it keeps on growing. But we are not going to sit back and admire our work. We are constantly looking for ways

to improve. Together with Karen, we are involved in discussions with an international university recognized as the creator of evidence-based medicine. We hope to announce a collaborative agreement with this institution in the near future."

Karen gets the final word regarding the Department of Clinical Research: "What we do provides doctors with feedback to improve the health care of all patients. If we weren't here, they might not know if what they are doing is good or bad — successful or not. We can help people all over the world by providing validated data so patients and surgeons can decide the right time, the right procedure, and the right person for successful outcomes."



Clinical Research

Karen K. Briggs, M.B.A., M.P.H., *Director of Clinical Research*; Kira Barclay; Marilee Horan, M.P.H.; Lauren Matheny; Christopher Pizzo; *Research Interns*: Mackenzie Herzog; Sue Baer.

In 2009, the Clinical Research department again expanded the database. With the establishment of our Imaging Research department, we now collect data on knee, shoulder, and hip MRIs. This will allow for many studies on the value of the MRI in sports medicine. In late 2009, the ankle database was developed. This database will track all patients who are treated for ankle problems at the Steadman Clinic. This will include both arthroscopy and open ankle and foot surgery. We look forward to submitting our first abstracts in 2010.

Ankle Research

The Steadman Philippon Research Institute has been collecting data on the knee since 1989, on the shoulder since 1993, and on the hip since 2005. All of these databases have been meticulously developed in order to collect the appropriate data. Within each joint, data is collected from the patient, the doctor, and the physical therapists. Subjective, objective, surgical and rehabilitation data, as well as our newest area of research, magnetic resonance imaging (MRI), is collected for each joint. In August of 2009, Dr. Thomas Clanton, a renowned foot and ankle surgeon, joined the Steadman Clinic and the Steadman Philippon Research Institute. Since then, we have been developing a foot and ankle database, which is being modeled after the databases that have already been established for the knee, shoulder, and hip.

One of the first forms developed was the new patient foot and ankle subjective questionnaire, which is completed by every new patient who is seen by Dr. Clanton. This questionnaire allows the Institute to collect multiple data points. Some of these data points include the most relevant functional and

pain scores for the foot and ankle. Other data that are tracked include mechanism of injury information, previous injuries or surgeries, injection history, sport participation information, activity level, and general health.

The second form developed was the foot and ankle surgery form for every patient who undergoes foot or ankle surgery. This form is six pages and tracks many different data points, including instability, articular cartilage defects, impingement, fracture patterns, and osteotomy, as well as ligamentous and tendon disruptions. By collecting all of these data, the Institute is able to track outcomes on every patient who undergoes a foot or ankle surgery. With these data, many studies can be conducted, thereby improving patient care.

For example, one study currently being conducted aims to determine predictors of return to activity following ankle fracture surgery due to sport participation. The ankle joint is the most commonly injured joint in sports, with ankle fractures being among some of the most common orthopaedic injuries. There are various factors that may affect patients' recovery. The incidence of post-traumatic arthritis following intra-articular fractures of the ankle is high, which may decrease

the likelihood of return to sport. Previous studies have demonstrated that decreases in activity level have been associated with increased osteoarthritis and other chronic diseases. Therefore, maintaining activity level in patients is important. If treated properly, patients may regain pre-injury functional levels. Although many studies have documented results following intra-articular fractures of the ankle, including fibular, bimalleolar, and trimalleolar fractures, few studies have addressed return to activity using validated outcome measures. The purpose of this study is to determine predictors of return to activity following surgical reduction and fixation of ankle fractures that occurred during sport participation by using validated outcome measures. These outcome



Back row left to right: Leandro Ejnisman, M.D., Kira Barclay, Karen K. Briggs, M.B.A., M.P.H., Christopher Pizzo. Front row left to right: Sue Baer; Lauren Matheny; Mackenzie Herzog; Marilee Horan; M.P.H.

measures will include the Tegner activity scale, which has been validated for use in the ankle, as well as the American Orthopaedic Foot and Ankle Society (AOFAS) Ankle Hindfoot Score, which are both collected on every patient seeking treatment for their foot and ankle at the Institute. With this data, physicians may be able to better inform patients of what they can expect after ankle fracture surgery in regard to return to sport.

Another study currently being conducted is designed to document outcomes following cartilage repair of the ankle. Cartilage lesions of the ankle are a common pathology. However, little is known about the relationship between initial cartilage damage and the development of osteoarthritis of the ankle. Nevertheless, some physicians believe these lesions influence the development of post-traumatic osteoarthritis, which is why it may be important to treat these lesions with a cartilage repair technique. Several methods have been described for these defects, but varied results have been documented. The purpose of this study is to document outcomes following cartilage repair of the ankle. Outcomes will be measured by function, symptoms, activity level, and patient satisfaction by utilizing validated outcome scores for the foot and ankle. These outcome measures will include the AOFAS Ankle Hindfoot Score, SF-12 general health, Tegner activity scale, and patient satisfaction. By performing this study, physicians will have more information to share with patients on the development and progression of osteoarthritis of the ankle.

HIP RESEARCH

The Treatment of Hip and Groin Injuries in NFL Athletes: An Algorithm for Evaluation and Treatment

Although many elite athletes sustain injuries to the hip, most of these injuries are incorrectly diagnosed as general hip or groin pain. However, many of these athletes have femoroacetabular impingement (FAI). This occurs when either the head of the femur, or the cup that surrounds the femur (acetabulum), is misshapen, causing rubbing, also known as impingement. This impingement is generally painful and can be treated with hip arthroscopy. When a patient undergoes treatment for hip/groin pain, using as hip injections or physical therapy, and they continue to participate in sports, it may cause more damage to the injured hip, since it is not being treated for the proper diagnosis. We wanted to present an algorithm for the treatment of hip and groin injuries in a large series of National Football League (NFL) athletes, so we conducted a study in which all NFL athletes who were treated by a single surgeon were retrospectively reviewed from 2000 to 2009. All intra-articular and extra-articular hip and groin injuries were documented. The length of symptoms/injury until treatment (TFI) and return to play data (RTP) were collected.



Fifty-one hips from 44 NFL athletes were treated from 2000 to 2009. Players underwent platelet-rich plasma injection and 34 patients underwent hip arthroscopy. Hip arthroscopy was successful for players with labral pathology and FAI. Players with degenerative changes in the hip and a longer duration of symptoms were unlikely to return to competition despite surgical intervention, showing the importance of early and accurate diagnosis of hip pathology in the elite athlete. The conclusion was the earlier we can properly diagnose hip injuries in elite athletes, the more quickly we can administer the proper treatment, thereby allowing them to return to play, while protecting the injured hip from further degeneration.

Decreased Femoral Head-Neck Offset: a Possible Risk Factor for ACL Injury: A Radiographic Correlation Study

Several studies have noted a change in hip motion when people tear their ACL. Hip motion is also decreased in patients who have femoroacetabular impingement (FAI). We completed a study that looked at patients with an acute ACL injury and then determined whether these patients also had bony changes on their femoral head, which are indicative of FAI. We examined the records of 53 patients with an ACL rupture and 42 who did not have an ACL injury. For the diagnosis of FAI, we used a radiographic measurement called the alpha angle. Those patients with an alpha angle of 70 degrees

Institute Research Shows Benefit of Hip Arthroscopy in Injured Professional Hockey Players

By Karen Briggs, M.B.A., M.P.H., Director, Clinical Research

Hockey is one of the top four professional sports played in the United States. The National Hockey League is made up of many players from Canada, where hockey is the official winter sport. The NHL, however, is an international league with players coming from more than nine countries.

Approximately 1.4 million people around the world play hockey, with just under 570,000 in the United States. Ice hockey requires repetitive motion and high impact. Ice hockey is a full-contact sport and carries a high risk of injury. Not only are the players moving at around 20-30 miles an hour (32- 48 kilometers per hour), quite a bit of the game revolves around the physical contact between the players. Skate blades, hockey sticks, shoulders, hips, and hockey pucks all contribute. The number of injuries is high.

Goaltenders experience extreme hip motion due to their use of the butterfly position. The hockey stride also places the hip in flexion, abduction, and external rotation. Hip injuries are common in hockey and are considered a cause of significant disability and are a potential cause of early retirement. A study recently published in the *American Journal of Sports Medicine*, authored by Dr. Philippon, reported the outcomes and return to sport in NHL hockey players who were treated with hip arthroscopy for labral tears and femoroacetabular impingement.

The study included nine defensemen, 12 offensive players, and seven goaltenders who had hip arthroscopy. The average age at the time of surgery was 27 years. The average time to return to skating/hockey drills was three months. Players completed a follow-up questionnaire at an average of 24 months after arthroscopy. The Modified Harris Hip Score, which is a patient-derived outcome score used to measure function, improved from 70 before surgery to an average of 95 at follow-up. The players were very satisfied with the outcome of the surgery. An important result of the study showed that players who delayed surgery had more chondral (cartilage) damage.

The study concluded that arthroscopic treatment of the professional hockey player (NHL) for debilitating hip pain allowed for return to sport accompanied with high patient satisfaction. This study highlighted the need for early intervention after injury. The earlier the players were treated, the less damage, and the earlier they returned to the ice without sacrificing a decline in long-term function.

Arthroscopic hip surgery does not require as much surgical trauma as does open hip surgery. Another recent study demonstrated the long rehabilitation required in hockey players following open hip surgery. Hockey players returned to hockey in seven months. In this study conducted by Dr. Philippon, the players returned to hockey in three months. The study demonstrated that arthroscopic hip surgery allows for shorter rehabilitation and quicker return to sport. This is one of the few sports in which results have been published in both open and arthroscopic surgery.

or greater were 93.6 times more likely to be in the ACL-injured group compared to those patients with less than 70 degrees. Based on our observations and the findings in this study, we propose that patients with abnormally elevated alpha angles will have diminished capacity at the hip to accommodate overall certain motions of the hip. This may expose the knee and the ACL to greater stresses.

Hip Arthroscopy in the Patient 50 Years of Age and Older

Treatment options for aging patients with hip pain, but without significant osteoarthritis (OA) changes, have been limited until recently. Many patients are told to wait until their joints have degenerated enough to be treated with replacement surgery. Hip arthroscopy has been shown to be an effective means to treat many intra-articular conditions of the hip.

We recently completed a study to determine the outcomes following hip arthroscopy in consecutive series of patients 50 years of age and older. We found that out of 160 patients, 92 percent did not require a total hip replacement one year following hip arthroscopy, 80 percent did not require a total hip at two years, and 75 percent at three years. If we only look at patients with adequate joint-space, 89 percent of patients did not require a total hip replacement at three years. Of the patients who did not have replacement, significant improvement in all outcome scores occurred and patients were very satisfied with their outcome.

This study showed that with proper patient selection, hip arthroscopy in the patient over 50 allows for improvement in function, patients are very satisfied with their outcome, and can return to an active lifestyle.

Hockey Players

Hip injuries are common among professional hockey players. The sport of ice hockey requires repetitive mechanical motion across the joints and, as a result, overuse injuries are common. Although little has been published on intra-articular hockey-related hip injuries, they are considered a cause of significant disability and are a potential cause of early retirement. The mechanics of the hockey stride place the hip in a position of flexion, abduction, and external rotation. Goaltenders are often in a position of hip flexion and internal rotation due to the use of the butterfly technique.

Twenty-eight male professional hockey players underwent arthroscopic treatment for intra-articular hip pathology by Dr. Marc Philippon. Player positions included 9 defensemen, 12 offensive players, and 7 goaltenders. All players returned to skating/hockey drills at an average of 3.8 months, with a range of one to five months. The average number of games played following surgery

was 94 (range, 3 to 252). Players were very satisfied with the outcome of their treatment. Those who had surgery within one year from the time of injury returned to sport at three months, and patients who waited more than one year returned to sport at 4.1 months after surgery.

This study showed that professional hockey players can return to skating/hockey drills and report excellent outcomes and high patient satisfaction at an average of two years following hip arthroscopy. The longer the players waited for surgical intervention, the longer it took them to return to hockey. Another study looked at professional hockey players following open surgical dislocation treatment for femoroacetabular impingement. Players were cleared to participate in their first game at average 9.6 months (range, 7-14 months), compared to average 3.9 months in our current study. Their study showed that three of five (60 percent) athletes returned to their previous level of sport compared to all athletes in our current study who returned to professional hockey.

Our study supports the idea that arthroscopic intervention may return athletes to play more quickly, when compared to the open surgical dislocation approach to treat femoroacetabular impingement and associated intra-articular hip pathologies. This study will be published in early 2010.

IMAGING RESEARCH

Prospective Analysis of MRI Diagnostic Capability for Meniscus Injuries by Location, Age, and Previous Surgery

The knee has two menisci, which are cartilage and act as shock absorbers for the tibia and femur. It is important to accurately diagnose tears of the meniscus in order to preserve as much of the meniscus as possible to prevent or delay the

onset of degenerative joint disease. Magnetic resonance imaging (MRI) has been established as an effective method to accurately diagnose meniscal tears of the knee. Few studies have looked at the accuracy of MRI in diagnosing meniscus tears, so we conducted a study in order to do so.

We hypothesized that MRI evaluation by a single skilled musculoskeletal radiologist would be more accurate and sensitive than has been reported in the previous literature. Data were collected for all patients undergoing MRI of the knee and read by one radiologist who was blinded to the physical examinations and results. MRI data then were compared to arthroscopic findings that were recorded at the time of surgery by a member of the surgical team. This study showed that MRI is a highly accurate diagnostic tool with regard to meniscal lesions and is not affected by age. Caution should be taken in patients who have undergone previous meniscal surgery, because it is more difficult to accurately diagnose a meniscal tear. This study is significant because it demonstrates the effectiveness of MRI in accurate diagnoses. However, surgeons now know that more attention must be paid in patients who have undergone previous meniscus surgery.

KNEE RESEARCH

The Fight Against Osteoarthritis Hylan G-F 20 and Corticosteroid: Expectations of Treatment and Outcomes Six Months Following Treatment

Recently, we conducted a study in which patients suffering from knee osteoarthritis underwent a series of injections in order to lubricate the knee joint, also known as viscosupplementation. The goal of this injection series was to help decrease knee pain and increase function without undergoing



surgical treatment. Patients answered questions about pain, function, pain medication, and expectations of treatment at one week, three weeks, six weeks, 12 weeks and six months following the injection series. The purpose of this study was to see if these injections could decrease pain and increase function in older patients suffering from DJD who wish to remain active.

This study showed that in our patient population, all patients reported pain as reason for seeking medical treatment. Forty-three percent expected most pain to be relieved and 36 percent expected all pain to be relieved. Eighty-nine percent considered improving ability to walk as very important. Eighty percent considered return to recreational sports very important. Other important expectations were to have confidence in knee, avoid future knee degeneration, and improve ability to maintain general health.

This study also demonstrated that patients could decrease their knee pain and pain medications, as well as increase their knee function, up to approximately six months following viscosupplementation protocol.

Patient Outcomes' Following Use of Knee Unloader Brace for Unicompartmental Knee Osteoarthritis

The prevalence of osteoarthritis (OA) is constantly increasing, making this chronic joint disorder the most prevalent worldwide. One contributing factor that may increase the severity of knee osteoarthritis is knee malalignment. Previous studies have shown that a compartmental increase in the load of the knee can cause an increase in knee degeneration of that compartment. When degenerative changes occur in the knee joint of active adults, it presents a conflict with actual activity level and desired activity level of the patient. However, we



know it is important to assist patients in maintaining activity level as they age.

Unloader braces are specifically designed to decrease the load on the degenerative compartment of the knee in order to improve function and decrease symptoms related to malalignment and osteoarthritis. Few studies have reported on active patients looking to improve their function and activity level. The purpose of this study was to determine whether unloader braces would provide a decrease in disability and improve activity levels in active patients with osteoarthritis and malalignment. Patients were enrolled in a prospective cohort study and excluded if they had a knee replacement or moderate to severe osteoarthritis in both lateral and medial knee compartments. At enrollment, three weeks, six weeks and six months, patients completed a questionnaire about general health, pain, function, and anti-inflammatory use (prescription and non-prescription).

This study showed that at three weeks, 24 percent reported a decrease in over-the-counter anti-inflammatories. Sixteen percent reported a decrease in prescription anti-inflammatories. At six months, 25 percent reported a decrease in over-the-counter anti-inflammatories. Eighteen percent reported a decrease in prescription anti-inflammatories. In this population, the unloader brace significantly decreased patients' symptoms, improved function, reduced medications and had improved patients' physical health.

Function and Activity Levels Correlate with Type of Meniscus Tear

The meniscus is a very important type of cartilage in the knee that acts as a shock absorber.

When the meniscus is torn, it is important to trim the meniscus back to a stable edge, while preserving as much as possible. Some tear types are more severe than others, resulting in a greater loss of meniscus. We wanted to see if type of meniscus tear correlated with function and activity levels in patients who were two years post-meniscectomy. We conducted a study in which we tracked patients who underwent partial medial meniscectomy or partial lateral meniscectomy. At the time of meniscus surgery, the type of meniscus tear was recorded. Tears were designated bucket handle/vertical longitudinal (BV), flap/radial (FR), complex (C), or horizontal (H). Patients were followed for a minimum of two years after meniscectomy. Patients completed questionnaires in order to assess function and activity levels.

For medial meniscus, there was significant correlation between tear type and patient age. Patients who had bucket handle or vertical meniscus tears were significantly younger than those with flap or radial meniscus tears, as well as those with complex tears. Patients who had bucket handle or vertical meniscus tears also had significantly higher functional scores than those with flap/radial or complex meniscus tears. Patients who had bucket handle tears also had higher activity

levels than those with complex tears. Twenty-eight percent of patients who had surgery to treat a medial meniscus tear required further surgery, while less than 15 percent of other types of medial or lateral tears required further surgery. Average time to second surgery was 2.4 years. Patients who suffered a bucket handle or vertical medial meniscus tear had better function and activity at two years, perhaps due to younger age. This group also required more reoperations the first two years after index meniscectomy. Tear type did not influence outcomes after lateral meniscectomy.

This study demonstrates the importance of understanding the effects tear type has on a patient's surgical outcome. With this study, surgeons can better inform their patients of the risk of subsequent surgery or expected activity levels after meniscus surgery.

Malalignment of the knee and repair of the meniscus

Every year, many people injure their meniscus. Although meniscus injuries are very common, these injuries usually occur in conjunction with another type of injury, such as ligamentous disruption or cartilage defects. We thought that it would be of interest to examine patients who underwent isolated meniscus suture repair of the knee and determine how many of those patients underwent a second meniscus repair based on the alignment or malalignment of their knee.

Malalignment of the knee is based on where the weight-bearing line falls. If most of the weight falls within the medial compartment, or the innermost part of the knee, it is medially malaligned, causing potential for the joint to collapse in that compartment and potentially leading to another meniscus surgery or osteoarthritis of the knee. If most of the weight falls within the lateral compartment, or the outermost part of the knee, it is laterally malaligned, causing potential for that compartment of the knee to collapse as well.

We designed a study that would allow us to focus on isolated meniscus injury and suture repair. By excluding any knee that had ligamentous or other pathologies, we could better determine a relationship between a second meniscus surgery and malalignment. We wanted to see if patients who had malalignment of the knee were more likely to undergo a second surgery on their meniscus.

Currently, we are tracking 68 patients who underwent an isolated meniscus suture repair surgery. We are obtaining a minimum of one-year follow-up on each patient in the study. Outcomes such as Lysholm score, Tegner Activity Scale, and patient satisfaction, as well as subsequent meniscus surgery, are being collected. We will continue to add more patients to this study as they progress to the one-year postsurgical time point. The more patients we can follow after surgery, the better the study will become. We feel that this information is important to better determine which patients are best suited for meniscus repair. The more information we collect on outcomes following meniscus surgery, the better informed our patients will become.



As a result, we can improve patient care and satisfaction, which is always the goal.

SHOULDER RESEARCH

Joint Preservation and Cartilage Restoration Procedures for the Shoulder-CAM Procedure

Shoulder osteoarthritis (OA) most often occurs in people who are 50 or older. In younger people, OA can result from an injury or trauma, such as a fractured or dislocated shoulder. The typical treatment for shoulder OA is a shoulder replacement. However, shoulder replacements in younger patients have a lower survival rate, which has been documented at 61 percent at 10 years. Shoulder pain is the key symptom in OA. A person with shoulder OA is likely to have pain while moving the shoulder, as well as after moving the shoulder, and the person can even have pain while sleeping. Short-term outcomes for osteoarthritic shoulders are treated surgically with general joint debridement, loose body removal, or synovectomy; and if the patient needs to improve shoulder motion, a capsular release is performed.

Using a variety of minimally invasive arthroscopic techniques and regenerative technologies, young or active patients with shoulder osteoarthritis may be able to delay the need for a shoulder replacement. The procedure, developed by Dr. Peter Millett, is called the "CAM" procedure, which stands for Comprehensive Arthroscopic Management. The goal of the CAM procedure is to eliminate pain, restore motion, and delay the need for shoulder arthroplasty in younger or active patients. To determine the effectiveness of the CAM technique, we looked at the results of 27 shoulders in 26 patients who underwent the CAM surgical procedure. The procedure

involves extensive debridement of the joint cartilage surfaces. Microfracture is performed for isolated areas of more severe cartilage damage. Soft tissue is debrided and loose bodies and scar tissue are removed to improve shoulder motion. Also, when needed, bone spurs on the inferior aspect of the humeral head and glenoid are removed to increase arm movement and potentially release any pressure on the nearby axillary nerve, which is a potential mechanism for pain relief in shoulder with OA. Other shoulder pathology is addressed, such as a biceps treatment or repairing rotator cuff tear.

The average age of the 26 patients in this study was 51 years (range, 28-68) and all had painful glenohumeral OA. There were 21 men and five women. At an average follow-up of 1.9 years after surgery, patients reported pain significantly decreased with activities of daily living, recreation, and sleep from preoperative levels. Patient satisfaction with outcomes averaged nine out of 10 points, with 10 being the best. One shoulder out of 27 progressed to a shoulder replacement approximately a year after the CAM procedure.

The CAM procedure is a viable short-term surgical treatment option in young or active patients wishing to decrease pain, improve shoulder function, and postpone the need for a shoulder replacement. These findings are especially important for younger or very active patients with physically demanding occupations or recreational desires who need more joint-preserving options. CAM can provide a window of improvement for symptoms and function before deterioration of the joint leads to a more significant operation. However, the durability of the CAM procedure has yet to be determined. Specific patient selection may be criteria in optimizing clinical outcomes.

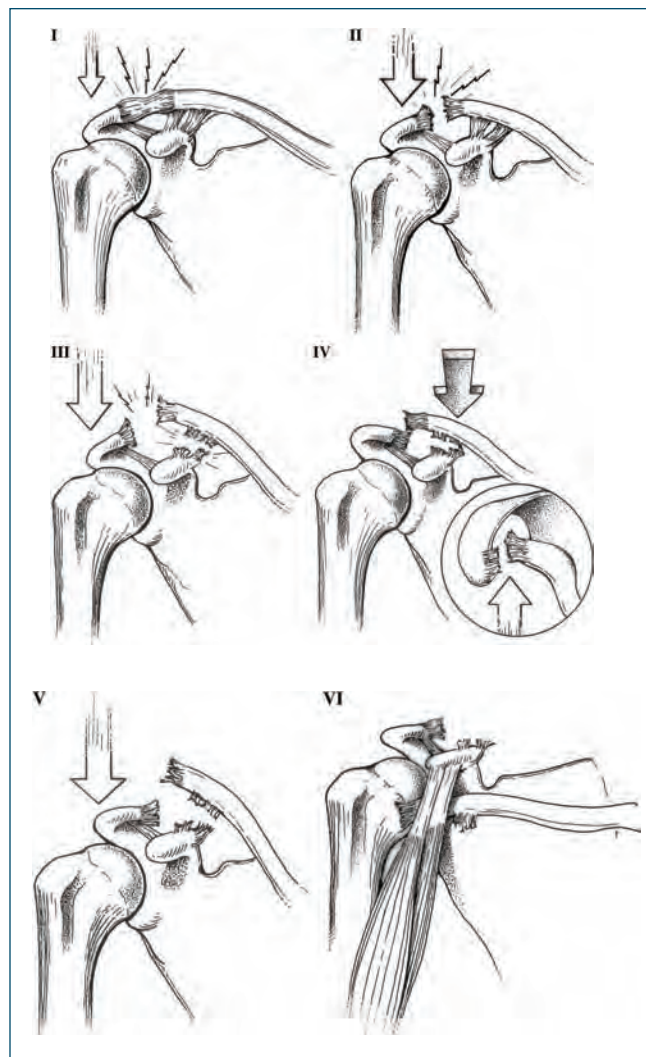
This study was accepted as an e-poster at the 2010 Arthroscopy Association of North America (AANA) annual meeting in Hollywood, Florida.

Acromioclavicular (AC) Joint Separation

Shoulder separations (AC joint dislocations) are very common, especially among athletes involved in contact sports. AC joint separations are acute injuries most often caused by a severe blow to the shoulder, whether by falling upon it or experiencing a hard hit by another person or hard object. A shoulder separation happens when a traumatic force causes the clavicle and the shoulder blade to come together, damaging the ligaments holding these two bones in place, which may weaken, sprain, or tear these ligaments, causing the joint to lose stability (Figure 1).



(Figure 1) Fluoroscopically guided osteoplasty to remove humeral head bone spurs



Shoulder separations are classified according to the severity of the injury and occur in one of six grades of severity:

Grade I: Mild sprain of the acromioclavicular (AC) joint capsule, where the ligaments surrounding the joint suffer a minor sprain, resulting in pain and stiffness. Treatment is Rest, Ice, Compression, and Elevation (RICE), plus rehabilitation.

Grade II: Moderate sprain with a tear of the AC joint and a partial tear of coracoclavicular (CC) ligaments. This injury causes a slight elevation of the clavicle (actually a drop of the humerus) and results in greater pain (than in Grade I) with loss of shoulder mobility. Treatment is RICE and rehabilitation

Grade III: Severe sprain with tear of both the AC joint and the CC ligaments. The clavicle appears to be elevated one width above the joint, and there is a visible bump on the

shoulder. Treatment depends on which shoulder is injured (injury to dominant arm or if the patient is involved in physical activities).

The injury can be treated well with either RICE and rehabilitation, or with surgery to stabilize the shoulder. The shoulder can also be stabilized later with surgical reconstruction.

Grade IV: The clavicle is displaced posteriorly into the trapezius muscle.

Grade V: The clavicle is displaced upwards, more than a Grade III separation.

Grade VI: The clavicle is displaced under the coracoid process.

Grades I and II AC shoulder separations are the most common types and rarely require surgery. Grades IV, V, and VI are less common injuries but usually result in surgical repair. Grades III separations are the most controversial. They are fairly common, but there is still some debate as to whether surgery is the appropriate treatment, though surgery may be recommended for high-level throwing athletes. Many physicians feel that the joint will heal without surgery if the injury is managed properly. The rationale behind a successful surgical approach is to re-establish the anatomical relationships of the AC joint ligaments and restore its role of suspending the shoulder blade from the clavicle systematically, aiding to support upper extremity weight.

Surgical treatment for a separated shoulder using a newer technique that allows for the repair using minimally invasive, arthroscopically assisted surgery is currently being developed. This technique allows for improved visualization with significantly less soft-tissue dissection than the traditional open methods. It also preserves the deltoid, which may preserve shoulder motion and lead to improved healing after surgery. Through three small incisions, the “separated” clavicle can be fixed back into its proper position, and full range of motion is quickly re-established within days of the procedure.

A study titled “Anatomic Acromioclavicular Reconstruction with Tendon Allograft: Technique and Preliminary Outcomes,” by Dr. Millett, was completed in 2009. This study looked at patients who had symptomatic AC separations that were reconstructed from 2006 to 2008. We studied the preliminary surgical outcomes of 19 patients who were surgically treated with AC joint reconstruction using a tendon allograft. Fourteen patients had open reconstructions and five were done with the arthroscopically assisted technique. Various data points, such as how the injury occurred and severity, time from injury to surgery, age, gender, and surgical data, were used to determine whether any of these factors were associated with better surgical outcomes. Minimum one-year



follow-up data were collected on 15 of 19 patients (79 percent). Average postoperative data was obtained at two years (range, 1.1-3.4 years). Average pain significantly decreased. Shoulder scores significantly improved after surgery from preoperative levels. Average patient satisfaction with surgical outcome was nine out of 10 points (range, 5-10). Patients had significantly less pain postoperatively with activities of daily living, work, recreation, and sleep from pre-op levels. Most patients were able to return to sports at, or to slightly below, their pre-injury level. Two patients with open AC repairs had revision reconstructions at one and three years postoperatively, with another patient needing surgical intervention to remove scar tissue at four months post-reconstruction.

Overall, this study showed good-to-excellent clinical results following AC reconstruction in this series of patients. Our results demonstrated predictable outcomes with good restoration of stability and function. The study was presented in July at the 2010 American Orthopaedic Society for Sports Medicine (AOSSM) annual meeting in Providence, Rhode Island.

Matt LaPrade: Raising Awareness of FAI

By Jim Brown, Executive Editor

Question: What do the following athletes have in common: Alex Rodriguez, Greg Norman, Michelle Kwan, Mario Lemieux, Kurt Warner, and Matt LaPrade?

Answer: They all had a relatively unknown condition called femoroacetabular impingement (FAI); they were all successfully treated by Dr. Marc Philippon, one of the famed orthopaedic surgeons at the Steadman Clinic; and they all returned, or will return, to very high levels of competition in their respective sports.

Matt LaPrade is a 16-year-old, two-sport honor student who will rejoin his hockey team this fall at Holy Family Catholic High School in Victoria, Minnesota, near Minneapolis-St. Paul. He was an All-Conference goalie during his freshman and sophomore seasons. Matt may not be as well-known — yet — as the Hall of Fame athletes mentioned above, but his case will be important in raising national awareness of FAI among young athletes. Here is his story.

MORE THAN JUST A GROIN INJURY

“My hips started hurting early in the 2008-2009 season,” he explains. “I thought I had just tweaked a groin muscle. It was sore at first, then the pain gradually increased. Both sides hurt, but the pain was worse on the right side. By the end of the season, I felt it almost all the time — sitting, walking, getting down into the butterfly position, whatever.”

Matt had a hip fracture four years ago, but hip and pelvic x-rays showed no signs of FAI. Once the 2009 season was over, he had another set of x-rays taken in Minneapolis and they showed FAI in both hip joints. The x-rays illustrate that FAI is a developmental condition. It doesn't exist at birth, but it can develop during the years when a person's bones are still growing.

PROFESSIONAL ADVICE AT HOME

Matt's mother, Sandy, was a critical care nurse and is now a fulltime mother of three boys. Chris, 18, just graduated from high school and will attend the University of Minnesota. Jeff, another goalie in the LaPrade family, is 14. Matt's father is Robert LaPrade, M.D., Ph.D., an internationally prominent knee and shoulder surgeon at

the University of Minnesota (now Director of Biomechanics Research at Steadman Philippon).

The LaPrades decided that Matt's treatment should be done in Vail. Matt says he didn't know about the Clinic or Dr. Philippon, but his parents did.

“We knew that it was the best orthopaedic clinic in the country and that Dr. Philippon was the best hip specialist in the world,” explains Sandy. The treatment Matt would receive is an arthroscopic procedure to correct excessive bone growth at the hip socket that characterizes FAI. It has been developed and validated by Dr. Philippon and his colleagues through research conducted at the Institute.

FIRST IMPRESSIONS

“My first impression of the Clinic and the Institute was good,” remembers Matt. “Everything felt comfortable. The place was packed, but everyone looked happy, and walking down those hallways and seeing the jerseys of all of those famous athletes who had been treated there made me feel good. I knew that this was not going to be career-ending surgery.”

Within hours after the first surgery, Matt was already doing rehab exercises. He stayed in Vail for a week in order to participate in specialized hip therapy at Howard Head Sports Medicine in the Vail Valley Medical Center. Four weeks later he was back in Vail for surgery on the other hip. “Dr. Philippon is probably one of the few hip surgeons in the world so familiar with the FAI condition that he knew a 16-year-old's body would be able to recover quickly,” says Sandy. “That's why we were able to have the second procedure done so soon after the first.”

UPDATE

How does Matt feel today? “Really good,” he says. “I started skating yesterday (six weeks after the second surgery). No pain, a little tightness in the left hip, but it gets better every day.”

What about the Steadman Philippon experience? “It's the best possible care you could get,” answers Sandy. “State-of-the-art everything. It's like nothing I had ever seen. The atmosphere is upbeat, everyone



Matt LaPrade is a two-sport honor student at Holy Family Catholic High School and All-Conference goalie in Victoria, Minnesota.

works together, and you know the decisions they make are backed by research.”

Matt has a word for other young athletes who might have hip pain or even FAI. “If the pain doesn't go away pretty quickly, see a doctor. Even if it happens after a season has started, do something about it sooner rather than later. That way, you'll be able to go all-out the next year.”

THE BIG PICTURE

Dr. Philippon, not surprisingly, sees the big picture. “Matt has a great future ahead of him. We were able to intervene early and treat his injury. The procedure gives him a healthier joint and a chance to continue playing his favorite sport at a high level without worrying about his hip as a limiting factor.”

Matt LaPrade didn't choose to be injured or to need surgery. But he is believed to be the youngest hockey player in the world to have had successful FAI surgery on both hips. By going through this process early in life, he has raised the awareness of a potentially career-ending condition and injury, and his story might encourage others to seek medical attention early rather than waiting and hoping that their hip pain will go away. That's enough to put Matt in our FAI Hall of Fame.

[Editor's Note: The butterfly technique is a style of play used by goalies in hockey. Butterfly goalies play with their feet apart and knees bent. On low shots they drop to their knees and spread their legs to cover the bottom of the net. Don't try this at home.]

SPINE RESEARCH

Diagnostic Questionnaire to Improve the Diagnosis of Low Back Pain

Low back (or lumbar) pain is a major cause of visits to primary care physicians. Low back pain can have many causes, but the most common diagnosis for the lumbar spine at the Steadman Clinic is herniated nucleus pulposus (HNP). In order to understand HNP, one must understand a little bit about spine anatomy. The spine is made up of 33 bones called vertebrae, and between the vertebrae are discs. The vertebral bones have a hollow center where the spinal cord is located. The vertebral bones also have holes where the spinal nerves exit from the spinal cord. The discs are made up of a cartilaginous substance similar to jelly. The center of the disc is called the nucleus pulposus and the outer area is called the disc annulus. When the center part of the disc pushes outside the outer part, this “jelly” material can put pressure on the spinal nerves exiting the spinal cord. Pressure on the spinal nerves can cause pain in the low back and, at its worst, can cause weakness in the muscles that these nerves stimulate.

Early diagnosis of HNP is important for relieving pain and for minimizing the time away from work, sports, and activities of daily living. In order to improve timely diagnosis of HNP and encourage appropriate referrals to spine surgeons for treatment, Dr. Corenman has been working with the Clinical Research department to develop a diagnostic questionnaire for primary care doctors to use. The questionnaire consists of 56 questions about daily activities. Over the past two years, this questionnaire was given to over 60 patients who came to the Steadman Clinic with low back pain. Almost 200 of these patients had HNP and about a quarter of those had HNP that was so severe it caused weakness in their muscles. Using statistical analysis, we were able to find 11 questions from the questionnaire that may help primary care physicians diagnose HNP with motor weakness. These questions included activities related to standing, walking, being in the fetal position, driving, sitting for prolonged periods, biking, getting into a car, dressing, and descending stairs. This diagnostic questionnaire is being refined for use by primary care practitioners in order to help them recognize HNP, as well as other common lumbar back problems, and thereby help people with low back pain get relief sooner.

Development of a Sport Activity Questionnaire for Use in Patients with Neck Pain

Being able to participate in sports has been found to be an important consideration for people with neck pain. A 2003 study (in the journal *Pain*) found that inability to participate in sports was one of the most commonly identified problems (47.9 percent of patients) for people with neck pain. In a 2009 study (in the journal *Spine*) of the most important consider-

ations in patients’ disability, sports activity ranked first among 37 activities. Therefore, being able to measure a patient’s ability to participate in sports is an important factor in making sure that a treatment has been effective. Although measures of sports activity exist and have been validated for use with the hip and knee, no sports activity scale has yet been validated for use with the neck.

We developed a sports activity scale for patients with neck pain in order to measure patients’ abilities to return to those activities that were most important to them. The scale included four questions about current and future desired sports participation and sports disability level. The purpose of this study was to determine the validity of these sports activity scale questions.

In order to understand how effective these questions were at measuring activity, we had to compare them with other questionnaires that were considered to be the best measures of general health and neck disability. Eighty-six patients answered the four sports activity scale questions, as well as the additional validated questionnaires. We found that two of our sports activity scale questions had similar results to those of the other questionnaires.

These questions may be used to help measure patients’ ability to return to sports and determine the success of surgery. The same scale is also being studied in patients with low back pain.





Biomechanics Research

Robert F. LaPrade, M.D., Ph.D., *Director*; Coen A. Wijdicks, Ph.D., *Deputy Director and Senior Staff Scientist*; Eric Giphart, Ph.D., *Director of Biomotion*; Kyle Jansson, *Research Engineer*; Casey Myers, *Junior Scientist*; Wesley Pennington, *Junior Scientist*; Justin Stull, *Intern*

By the end of 2009, Biomechanics Research was poised to begin a new and significant phase of growth in terms of staff, technology and equipment, a patient-friendly environment, and national and international collaborations.

STAFF

Robert F. LaPrade, M.D., Ph.D., was named Director of the Biomechanics Research Laboratory, and Coen A. Wijdicks, Ph.D., accepted a position as Deputy Director and Senior Staff Scientist.

Eric Giphart, Ph.D., was promoted to become Director of Biomotion, which allows the department to become more efficient in motion analysis research. As Director, Dr. Giphart not only will have more freedom to conduct biomotion research in general, but by incorporating dual-plane fluoroscopy into research projects, he will have more flexibility to pursue the department's goals.

Kyle Jansson, Research Engineer, will be instrumental in developing robot specifications and in designing and constructing a machine shop within the department.

Two Junior Scientists, Casey Myers and Wesley Pennington, are continuing their work on ACL injury prevention and biomotion of the shoulder, respectively. Justin Stull, Intern, is conducting research on youth hockey as it relates to early screening of hip disorders.

TECHNOLOGY AND EQUIPMENT

The remodeled laboratory will consist of three areas: (1) a biomotion lab, (2) an *in-vitro* testing area where the robotics equipment will be housed, and (3) a bioskills area that will be used for surgeons to demonstrate techniques and to train Fellows at the Institute. The facility will also allow SPRI staff members to demonstrate new devices that may not have been available or observed during doctors' residency years.

Upon completion, the biomotion laboratory will have synthetic ice for hockey and nets to catch golf balls and baseballs. Dual-plane fluoroscopy technology will allow the department to measure different joints in the body from a three-dimensional, real-time perspective.

The department is working with KUKA Robotics, a Detroit-based company that established a medical research focus in addition to their already recognized automotive division. Biomechanics staff have met with KUKA officials and the company is developing a robot that meets the Institute's specifications. Using this technology, the department will be able to test joints in a manner that will enhance and validate joint reconstruction techniques.

The department also made plans to begin using the Instron E10000, the industry standard in strength testing with loads and torque. This device will be used to test fixation strength, surgical procedures, and joint reconstruction techniques.

PATIENT-FRIENDLY ENVIRONMENT

In the biomotion division of Biomechanics Research, the staff is designing and constructing a waiting area that will include a well-designed window that separates the patient waiting area from the biomotion lab. The divider will make it possible for tours to pass through the facility without interfering with the work that is being conducted, and it will allow people to observe a friend or family member as he or she undergoes motion testing.



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

Dr. Coen Wijdicks Brings “Bench-to-Bedside” Research Skill Sets to the Institute

By Jim Brown, Executive Editor

“It took me a full micro-second to accept the offer when Dr. LaPrade invited me to join him at the Steadman Philippon Research Institute,” says Coen Wijdicks, Ph.D., who has been named Deputy Director and Senior Staff Scientist of the Biomechanics Research Department.

“It was an easy decision because I knew about the famed Institute,” he adds. “That why it is such a humbling experience to be here. It was an opportunity I couldn’t pass up.”

“I chose to bring Dr. Wijdicks (pronounced v -dix) to the Institute because of his work ethic, his excellent organizational skills, his professionalism, and his passion for orthopaedic research,” says Robert LaPrade, M.D., Ph.D., who joined the Institute earlier this year as Director of Biomechanics Research. “Coen is a very driven and purposeful young man.”

“Driven and purposeful” may be an understatement when you examine Dr. Wijdicks’ credentials. He has degrees from Colorado State University, Rush University Medical Center in Chicago, and the University of Oslo in Norway. He completed his dissertation under the direction of Lars Engebresten, M.D., Ph.D., who is considered to be one of the top sports medicine physicians and researchers in Europe and who is a member of the Institute’s Scientific Advisory Committee.

Dr. Wijdicks has published over 30 articles in peer-reviewed scientific journals, presented more than 70 abstracts at national and international meetings, and won 10 awards for excellence in research. Before accepting the position at Steadman Philippon, Dr. Wijdicks had been a Research Fellow in the Department of Orthopaedic Surgery at the University of Minnesota under the mentorship of Dr. LaPrade. “I’ve been given the great fortune of having some of the greatest mentors in the world who were willing to teach me academic rigor,” says Dr. Wijdicks.

BENCH-TO BEDSIDE-RESEARCH

The common focus of Drs. Wijdicks and LaPrade is a concept called translational

medical research — or bench-to-bedside research. “He has similar goals as mine in that we desire to perform meaningful bench-to-bedside research that supports our clinical care and advances the care of athletes and patients nationally and internationally,” explains Dr. LaPrade.

Dr. Wijdicks states that, “When a patient comes to Dr. LaPrade for knee reconstruction, the procedure is not conducted without supporting research behind the injury and treatment. Every patient he sees is receiving the most novel, while scientifically proven and published, techniques possible. My research is very clinically applicable. It is designed to be studied by clinicians and researchers in the field of orthopaedics and sports medicine. Together, our team designs research studies, conducts them in a laboratory, and biomechanically validates the outcomes. These findings then go to the operating suite to benefit the patient. The continued collaboration with physicians and researchers allows for a process that comes full circle with the ultimate goal of advancing patient care and outcomes.”

SHARED GOALS

Drs. Wijdicks and LaPrade also share the same goals for the Biomechanics Research Laboratory at the Institute. The first is to position the orthopaedic research laboratory at the Steadman Philippon Research Institute as one of the premier facilities in the world within the next three years. This will include remodeling the laboratory area, employing innovative research techniques, establishing an invitro biomechanics division and an expanded bio-skills laboratory for teaching, and continuing to publish in high-quality, peer-reviewed journals. Exhibit A: Dr. Wijdicks was the lead author of an article on knee injuries published in the May 2010 issue of *The Journal of Bone and Joint Surgery*.



An equally important priority is to get a four-year grant from the Medical Commission of the International Olympic Committee that would establish the Institute as the only Olympic-designated sports medicine research center in the United States. Getting the grant will further demonstrate the Institute’s clinical, educational, and research expertise regarding elite athletes. “What Steadman Philippon has in common with other great research institutions in the world is that they all operate on a premise that is made possible by philanthropy,” says Dr. Wijdicks. “When people and corporate sponsors support the Institute, current and future patients get the benefit. Without this research component medical advances are nonexistent.”

Dr. Wijdicks reverts to his sports background to describe the working environment of the Steadman Philippon Research Institute. “Here at Steadman Philippon,” he says, “it’s like everyone is running the same race. We have a well-orchestrated team that is dedicated to reaching the same goals. The future looks bright.”

FUTURE COLLABORATIONS

We will continue our association with Colorado State University, and we are currently pursuing a research grant with that institution. The department is also in the process of developing grants in conjunction with the University of Oslo regarding ACL reconstruction and other surgical procedures. The department has had many successful joint projects in the past with both universities and looks forward to future collaborations.

By engaging in collaborative biomechanics research, the Institute, its surgeons, and scientists get new perspective on techniques and methodology. This interaction offers a unique opportunity to work in a laboratory setting for a period of time and then to meet with a collaborator and share preliminary research results. This diversity of perspectives is invaluable to the research process.

PROJECTIONS

The department is moving forward with a very academic mindset. Outcomes are measured by the number and quality of publications, abstracts, presentations, and awards.

Along with that mindset comes the responsibility of our scientists to serve on national and international boards and committees. The ability to be present at meetings and to present the outcomes of our research allows the Institute to have an influential voice in the medical, scientific, and academic communities. As the number of meetings and conferences increases for each specialty, even more contributions will be expected from Biomechanics Research scientists.

It is a privilege to be a part of these meetings. Although we are engaged in not-for-profit work, we maintain a passion for researching, educating, and learning. The future of the Institute demands that we become even more academically focused.



Imaging Research

Charles Ho, M.D., Ph.D., *Director, Member, Scientific Advisory Committee*

Imaging has become a vital part of orthopaedic and sports medicine for diagnosis, treatment, and postoperative evaluation. In 2009, the department of Imaging Research was established and a director was named, making the department the newest area of research at the Institute and taking its place beside Basic Science, Clinical, and the Biomechanics.

The focus of the Imaging Research Department in 2009 was to continue developing imaging forms for collecting and integrating data. The data are based on examinations of Steadman Clinic patients and are subsequently entered into the Steadman Philippon Research Institute database. Those processes are most advanced in regard to images of the knee. The knee imaging data form has evolved and has facilitated the greatest collection of patient exam information.

The Department also has developed a shoulder imaging data form and has begun collecting clinical patient exam data. A hip imaging data form is being developed, and clinical patient hip exam data will begin to be collected for incorporation in the Institute's database. The department has begun working with Dr. Thomas Clanton, who joined the Institute in August 2009, on foot and ankle imaging examinations. Dr. Clanton had previously developed a clinical and operative data collection form for the patients he treats. The department is working with Dr. Clanton to adapt that form to a foot and ankle imaging data form, with which clinical patient foot and ankle imaging data will be collected.

The Imaging Research Department continued its alliance with Siemens Medical Solutions USA and conducted ongoing discussions about how best to proceed with 3.0 Tesla magnetic resonance imaging (MRI) technology. The equipment was installed the previous year for clinical imaging research as well as for Biomechanics Research modeling studies.

In orthopaedic sports medicine, the gold standard for clinical imaging is the MRI, which allows clinicians and researchers to see bone structures, cartilage, menisci, and surrounding soft tissue structures such as tendons, ligaments, and muscles. The department used Siemens MRI technology to implement new sequences that produced 3-D volume imaging. This type of information is particularly helpful to the Biomechanics Research Laboratory for modeling studies, as well as for patient clinical exams.

Imaging Research continues to work with Siemens in developing the appropriate procedures for conducting studies involving articular cartilage. The goal is to quantify the results of articular cartilage imaging, and some of the needed tools will be developed in-house.

Work continues with Siemens to maintain and upgrade the existing Siemens 3-T scanner with cutting edge technology, including the area of scan sequences and of imaging coils. Signals involved in magnetic imaging are very small and dedicated optimized surfaces are needed to detect the signals and create high-resolution images. The coils have to be specifically designed to capture images for each joint being scanned, and the department works diligently to ensure that its technological capacity ensures the quality of images needed by the expanding pool of physicians and researchers at the Institute.

In 2009, plans were put into place to select the first Sports Medicine Imaging Research Fellow. That person will assist in conducting studies, collecting and analyzing data, and in presenting and reporting the findings for orthopaedic sports medicine conferences and peer-reviewed literature. The first papers and presentations at orthopaedic sports medicine meetings based on the Institute's clinical imaging data were produced in 2009.

The goals of the Imaging Research department in its first year were to develop the alliance between the Institute and Siemens Medical Solutions, get state-of-the-art technology in place, and begin the process of entering every scan taken at the Steadman Clinic into the Steadman Philippon Research Institute's database.

In the second year (2009), it became even more active in implementing clinical and research programs, as well as addressing new challenges. This accelerated level of activity is well under way and has been driven by the recognition of the value of imaging as it relates to the departments of Basic Science, Biomechanics, and Clinical Research.





Kimberly-Clark

Dr. John Feagin and Martha Head Bring Accomplishments, Support, and Service to the SPRI Fellowship Program

By Jim Brown, Executive Editor

The Steadman Philippon Research Institute Fellowship Program has long been recognized as one of the most prestigious, selective, and demanding sports medicine programs in the world.

Two of the people involved in the success of the program are John Feagin, MD, and his wife, Martha (Marty) Head. They became involved with the work of the Institute in very different, but very important ways.

Dr. Feagin is Emeritus Professor of Orthopaedics at Duke University and is often referred to as one of the fathers of modern sports medicine. His career, which began as a graduate of the U.S. Military Academy at West Point and later, the Duke University School of Medicine, has been honored by academic, professional, and medical entities worldwide.

Although Dr. Feagin thought he was “fully” retired, it hasn’t exactly worked out that way. He remains active in the orthopaedic medical community, attends meetings, writes articles and books, is a member of the SPRI Scientific Advisory Committee, and serves as a mentor for the Fellows.

“Mentor-in-Chief is not an official title,” says Vice President for Program Advancement John McMurtry, “but it describes his role for those in the Fellowship program.”

“My entire career has either been educating residents or working with fellows,” says Dr. Feagin. “Early on, I was interested in Dr. Steadman’s Fellowship Program, and it has been a joy to watch it evolve from day one to what it is now.”

What “it” is now is a program that provides advanced training to a select, highly-talented group of orthopaedic surgeons who are chosen from a pool of approximately 150 applicants yearly to become Steadman Philippon Fellows. These men and women spend a year in Vail learning new surgical techniques and participating in cutting-edge research with the Institute’s physicians and scientists. Dr. Feagin is there to guide, advise, and assist the Fellows. Official title or not, he’s the Mentor-in-Chief.

The Fellowship program has launched careers of physicians to positions throughout the world in private practice, at academic institutions, and as team physicians at the high school, college, and professional levels. Since its inception, 179 Steadman Philippon Fellows have implemented the advanced concepts they learned during their fellowships in their own practices.

THE STEADMAN/FEAGIN/HEAD CONNECTION

Dr. Feagin’s long-standing relationship with SPRI Founder Dr. Richard Steadman began when Dr. Feagin was a U.S. Army officer and surgeon stationed in San Francisco. “We had this bright young physician named Richard Steadman, and the two of us had many common interests in the field of orthopaedics,” recalls Dr. Feagin. “Also, I needed to place some of our military residents in programs around the country and we began sending some of them to Dr. Steadman. We knew that he was an outstanding surgeon and a role model in the way he took care of patients and in his forward thinking.”

“I’ll never forget the day he approached me and told me of his interest in moving his practice to Vail and of establishing an orthopaedic research foundation. I was absolutely ecstatic for him.”

“There is one other connection in which Dr. Steadman was involved,” says Dr. Feagin. “Six years ago he introduced me to Marty Head, and we became husband and wife five years ago. I owe Dr. Steadman a huge debt on many accounts.”

Martha Head was way ahead of Dr. Steadman and Dr. Feagin in “discovering” Vail. She is the former president and CEO of CMI, Inc., an electronic law enforcement company. She’s active in organizations that represent her interests in education, the arts, and sports. She supports the Vail Valley Foundation, Vilar Center for the Performing Arts, The Family Learning Center, and Colorado Ski and Snowboard Hall of Fame. She serves on the boards of her alma mater, St Mary-of-the-Woods College, the Notre Dame Business Advisory Council, the United

States Ski and Snowboard Association, and the Wilmer Eye Institute in Baltimore.

A resident of Vail for more than 40 years, she and her late husband, Howard Head, established what later became known as the Howard Head Sports Medicine Center. It is one of the world’s leading rehabilitation facilities and is an important factor in the success of the Steadman Clinic and Steadman Philippon Research Institute. “Orthopaedics is greatly enhanced by the system of rehabilitation we have now,” says Ms. Head. “It’s just different here – more original, more creative, and more functional. The Center has a hand-and-glove relationship with the Clinic and the Institute, and that includes those in the Fellowship Program.”

“When Dr. Steadman came to Vail,” says Ms. Head, “it was almost like a prophet arriving. We were all excited about his plan for orthopaedic sports medicine as it stood then and about the possibility of what it could become in the future.”

“I became a patient of Dr. Steadman when I injured my knee. And he performed ACL surgery on me,” she says. “He was such a kind and benevolent man, along with being a remarkably brilliant surgeon, and I was impressed by the whole experience.”

Now Ms. Head gives her philanthropic support to the Institute and to the Fellowship Program, but her involvement does not stop there. “Her role is quietly in the background,” explains McMurtry, “but she steps forward when asked. She hosts our Fellowship reception at her home. This is a wonderful opportunity for all of us, including the Fellows, to thank the sponsors.”

“We want more people to support the program,” says Marty, “so the relationship between the Fellows, the Clinic, the Research Institute, the Sports Medicine Center, and the community continues to improve. No matter how good you are, you have to keep getting better. Every year we seem to have more communication with the Fellows, and we try to make sure that they are involved with the community.”



SETTING THE FELLOWSHIP PROGRAM APART

“There are very few fellowship programs in private practice,” says Dr. Feagin, “and that means that we don’t have to compete with resident training programs associated with universities. We can have total focus on the training that these young doctors get in a fellowship program. That the Institute has the breadth and depth of the staff to serve these fellows is just incredible, as well as the clinical and research opportunities afforded by the Clinic and the Institute. That’s what really sets this program apart and makes it an endeavor in which I want to be involved.”

There’s more, according to Dr. Feagin, including worldwide referrals, the depth

and breadth of the staff, the new surgical techniques they introduce, and the unparalleled database. But the Fellows seem to especially value the collegiality, the role modeling, and the mentoring, not just by Dr. Feagin, but by all of the Steadman Philippon physicians and scientists.

LOOKING FORWARD

“We want our Fellows to continue to become even more involved in the Vail community, the regional community, and the national/international medical community,” says Dr. Feagin. “We also want to build a stronger alumni base. There are almost 180 graduates of the Fellowship Program. Medicine moves on, and this Institute allows the former Fellows to move forward together. They represent a huge potential.”

Martha Head has an important message regarding support of the Steadman Philippon Research Institute and the Fellowship program. “There is a plethora of new ideas coming out of the research conducted at the Institute. We need your support because the Institute is sharing its knowledge and extending its influence throughout the world.”

“We understand that everybody can’t give to everything,” she adds. “We encourage those who are already supporting medical research to continue, but we also want them to hear what we have to say. And one of the things we have to say is to consider supporting the work of the Research Institute and perhaps even supporting one of the Fellows.”

Visiting Scholars Program Brings French and Brazilian Physicians to the Institute

By Jim Brown, Executive Editor

Dr. Jean-Yves Schoenahl and Dr. Leandro Ejnisman have spent a year observing, assisting, researching, and writing before taking their knowledge and skills to Europe and South America.

Two orthopaedic surgeons, Dr. Jean-Yves Schoenahl of Strasbourg, France, and Dr. Leandro Ejnisman of Sao Paulo, Brazil, are spending a year at the Steadman Philippon Research Institute as participants in the SPRI Visiting Scholars Program.

The physician-scholars will work with Steadman Philippon surgeons and scientists to learn new surgical techniques, observe clinical practices, attend professional meetings, conduct research, and submit the results of their research to orthopaedic journals.

Dr. Schoenahl received his medical training at the University of Strasbourg (formerly Louis Pasteur University), where he will return later this year to continue post-graduate studies. He was invited to participate in the SPRI Visiting Scholars Program after being selected from candidates throughout Europe. The European component of the Scholars Program was developed in conjunction with and is funded by Arthrex, Inc., an orthopaedic medical device company founded by its president, Reinhold Schmieding.

GETTING THE CALL

"I first learned about the Steadman Clinic and the Steadman Philippon Research Institute when I read that some professional soccer players in Europe had gone to Vail to be treated for their injuries," recalls Dr. Schoenahl. "Of course, I also knew about Dr. Richard Steadman because of his worldwide reputation in sports medicine and his microfracture procedure. One of the doctors in France had worked with Dr. Peter Millett when he was in Boston, and he encouraged me to apply for the Visiting Scholars Program. He told me that Steadman Philippon would be the best place for me to improve my surgical skills and to conduct research."

"Jorge Paulo Lemann (one of the most important business leaders in Brazil) supports SPRI's Visiting Scholars Program and is also a major sponsor of the Brazil Institute of Health Technologies, which pays for my scholarship," explains Dr. Ejnisman, who was awarded his scholarship over a field of 20 applicants.

Dr. Ejnisman recently completed his formal medical education at the University of Sao Paulo and will focus on hip surgery. "I knew about the international reputation of Dr. Marc Philippon, and my brother, who is also a physician in Brazil, had spoken with him. I applied for the Visiting Scholars position, sent them my credentials, and was interviewed in Rio de Janeiro. When I got the news that I had been accepted into the program, it was a very happy day."

MAKING THE TRANSITION

For Drs. Schoenahl and Ejnisman, the transition to the United States has been smooth. "Vail is a very pleasant place," says Jean-Yves. "The people in the town and at Steadman Philippon are very open-minded and eager to help. The city has an international feel and it is easy for people from other countries to meet others. This is true; I'm not saying it just to be nice."

Both also had the advantage of communicating with their predecessors in the Visiting Scholars Program. Dr. Schoenahl got advice of Dr. Florian Elser of Germany, and Dr. Ejnisman was helped by Dr. Bruno Gonçalves Souza.

"He told about his experience and what to expect when I arrived in Vail and began my work at the Institute," says Dr. Ejnisman. "I was even able to move into the same apartment where Dr. Gonçalves lived."

Language, which is a major adjustment for many people, has not been an issue for Leandro, probably because he speaks five languages. Although Dr. Schoenahl did not have conversational English experience when he arrived in November of 2009, his language skills are very impressive. He says he still has problems with understanding slang, but so do many Americans.

DAILY ROUTINES

Now that both men have settled into their routines at the Institute, their schedules are filled with time spent in the operating room, attending to clinical duties, going to in-house education sessions, reading about research conducted at the Institute, and working on their own research projects.

Dr. Ejnisman, whose focus at the Institute is hip arthroscopy, observed more than 20 procedures performed by Dr. Philippon in just his first two weeks at the Institute. Dr. Schoenahl, whose research will center on management of the shoulder joint, spends much of his time observing, assisting, and working with Dr. Millett.



Dr. Leandro Ejnisman



Dr. Jean-Yves Schoenahl, left, with Dr. Peter J. Millett.

"What I notice here is that the surgeons are very involved in current research," says Dr. Schoenahl, "and it shows in their procedures. They want to do what is best for their patients."

"What surprised me about Dr. Philippon is how friendly he is," says Dr. Ejnisman. "To be such a famous guy, he is a really open person. He knows everybody and speaks to everybody. In the operating room, what he does isn't easy, but he is a very skilled and experienced physician who makes it look easy."

WHAT'S NEXT

At the end of their year at SPRI, Dr. Schoenahl and Dr. Ejnisman will return to their countries. Dr. Schoenahl will resume his studies in Strasbourg and Dr. Ejnisman will begin his practice in Sao Paulo. Both would eventually like to continue as orthopaedic surgeons, teach medical students, and conduct research.

"There are still many questions yet to be answered regarding hip arthroscopy," says Dr. Ejnisman. "I'd like to do research to answer some of those questions."

"The Visiting Scholars Program has given us a great opportunity to improve ourselves and to discover a new culture," says Dr. Schoenahl. "It is very important for us to spread the knowledge of orthopaedic surgery and sports medicine at the Steadman Philippon Research Institute to the rest of the world."

Education

The Institute's primary mission is to conduct research that can be applied directly to orthopaedic medicine. To this end, education is an important part of our work. We offer training throughout the year to physicians-in-residence, to visiting medical personnel, and during international medical meetings. Members of the staff report their research through publications, presentations, and posters. The education department provides administrative support for educational programs and conferences, responds to the press, and teaches high school students about human anatomy and injury.

FELLOWSHIP PROGRAM:

Learning As We Teach

Considered one of the most prominent and rigorous academic fellowship programs in orthopaedic sports medicine, the Fellowship Program is at the core of the Institute's educational effort. Each year, six young orthopaedic surgeons are chosen from more than 160 candidates to become Fellows. They are with us for an intensive 12-month training period to refine their skills in orthopaedic surgery and to investigate the causes, prevention, and cures of degenerative arthritis, as well as the treatment and prevention of injuries. Our goal is to prepare our Fellows to be leaders in the field of orthopaedic sports medicine for the remainder of their careers.

The Institute currently maintains a network of 180 Fellows who share advanced ideas and inspire each other to higher levels. We are fortunate in Vail to work with the best young physicians in the world. Their insight and enthusiasm during this rewarding program has demonstrated to us many times over that we, too, learn as we teach. We have successfully completed our third year of the Visiting Scholars Program, with Jean-Yves Schoenahl, M.D., joining us from France and Leandro Ejnisman, M.D., from Brazil. These educational and research-oriented programs are sponsored by corporate and individual donors. Arthrex, Inc., is sponsoring our European Visiting Scholar and Jorge Paulo Lemann is supporting our Brazilian Visiting Scholar. These scholars learn new surgical techniques and conduct research that is submitted for publication in leading orthopaedic journals.

2009-2010 FELLOWS

Six New Physicians Introduced

Six new members of the incoming "class" of Fellows started their year in August, refining their skills as they make final preparations for careers as orthopaedic surgeons. Regarded as one of the most rigorous academic fellowship programs in orthopaedic sports medicine, six new orthopaedic surgeons are selected from a pool of more than 160 applicants.

The Fellows spend their year learning new surgical techniques that include an opportunity to participate in research with Institute scientists. Each Fellow will be actively involved in Clinical Research, Basic Science, Biomechanics, and Imaging Research.

The Fellows, having completed their formal training in leading orthopaedic programs, share knowledge they have gained from years of training with the physicians and scientists of the Institute.

2009-10 Institute Fellows

John C. ("Jack") Carlisle, M.D.

Dr. Carlisle graduated summa cum laude from Duke University, where he earned a bachelor of science degree and membership in Phi Beta Kappa. He completed his medical school and residency training at Washington University in St. Louis, where he was a member of the Alpha Omega Alpha Medical Honor Society. During his time there, he provided care for high school and collegiate athletes and assisted with team coverage of the St. Louis Blues and Rams. His research



How do surgeons get accepted into the Fellowship Program?

Every year, on average, approximately 600 surgeons graduate from orthopaedic residency programs in the United States. These surgeons become board certified and are ready to enter practice. A select few elect to continue their education for one more year in a fellowship program such as the Institute's program. Last year more than 160 applications were received by the Institute from young surgeons around the world. After interviews and presentations, six were selected by the screening committee.

In 2010, the Institute will be offering a unique, first of its kind, Sports Medicine Imaging Research Fellowship, sponsored by Siemens.

2009-2010 FELLOWS

Six new members of the "class" of Fellows spend a year refining their skills as they make final preparations for a career as orthopaedic surgeons. Each Fellow has the opportunity to be actively involved in Clinical Research, Basic Science, and Biomechanics Research. In addition, they also experience hands-on medical coverage of Major League Baseball's Colorado Rockies, the NFL's Denver Broncos, the U.S. Ski Team, and Eagle County high school sports teams.

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

Where Are They Now... ?

The graduating class of 2008/2009 Institute Fellows are busy establishing new careers in orthopaedics.

Christopher B. Dewing, M.D., is practicing for the U.S. Navy at the Naval Medical Center San Diego. Dr. Dewing, his wife Jill, and their children were happy to move to Southern California, close to Jill's family, and perhaps a happy medium between Guantanamo Bay, Cuba, and Vail, Colorado.

Jason M. Hurst, M.D., joined a private practice, Joint Preservation Institute at Joint Implant Surgeons, in New Albany, Ohio.

R. Timothy Greene, M.D., moved to Greenwich, Connecticut, and is practicing with the group, Orthopaedic & Neurosurgery Specialists.

Jarrod T. King, M.D., lives in nearby Boulder and has joined the Longmont Clinic.

Ryan G. Miyamoto, M.D., moved to Fairfax, Virginia, and practices with Fair Oaks Orthopaedics.

Charles J. Petit, M.D., joined a private practice, Cascade Orthopaedics and Sports Medicine, located in The Dalles and Hood River, Oregon.

background includes a focused interest in the arthroscopic management of young adult hip pathology. He has published articles in multiple orthopaedic journals, including *The Journal of Bone and Joint Surgery*, *American Journal of Sports Medicine*, *Clinical Orthopaedics and Related Research*, and *The Journal of Knee Surgery*.

Chad M. Hanson, M.D.

Dr. Hanson graduated summa cum laude with a degree in biology from the University of Nebraska at Omaha. He was the class president and a member of the Alpha Omega Alpha Honor Society while earning his medical degree at the University of Texas Southwestern Medical School in Dallas. While completing his orthopaedic surgery residency at UT Southwestern, Dr. Hanson assisted with local football team coverage. He received the G. Truett James Excellence in Teaching Award as a chief resident and was a national finalist for best clinical paper on his work with *Adolescent Tibia Vara*. He has played basketball competitively all of his life and recently began participating in triathlons.

Andrew T. Pennock, M.D.

Dr. Pennock graduated summa cum laude from Dartmouth College with a degree in chemistry. During his time in New Hampshire, he captained the ski team and was a two-time All-American. For his athletic achievements, he was inducted into Dartmouth's athletic Hall of Fame, The Wearers of the Green. After college, he attended medical school at the University of Chicago, where he graduated with honors and became a member of the Alpha Omega Alpha Medical Honor Society. Dr. Pennock went on to residency training at University of California San Diego. At UCSD, he completed a research fellowship focusing on cartilage repair techniques. His work has been presented internationally and has resulted in multiple publications and awards.

Bradley C. Register, M.D.

Dr. Register graduated from the University of Georgia, where he was a three-year letterman at offensive guard on the football team. He was awarded the Dean Tate Award, which is given to the top male scholar athlete at UGA, as well as the "Peach of an Athlete" Outstanding Community Service Award. Brad attended Johns Hopkins University in Baltimore, Maryland, for medical school and completed his orthopaedic surgery residency at Emory University in Atlanta, Georgia. His collegiate football experience, coupled with his love for medicine, led him to a career in sports medicine. He has worked on multiple research projects during his medical studies. His research interests have included cervical myelopathy, cerebral palsy, and rotator cuff reconstruction.



Back row, left to right: William I. Sterett, M.D.; John C. Carlisle, M.D.; Suketu B. Vaishnav, M.D.; Marc J. Philippon, M.D.; Andrew T. Pennock, M.D.; Tom Hackett, M.D.; David C. Karli, M.D. Front row, left to right: J. Richard Steadman, M.D.; Carl H. Wierks, M.D.; Bradley C. Register, M.D.; Chad M. Hanson, M.D.; Peter J. Millett, M.D., M.Sc.; Randy W. Viola, M.D.

Suketu Vaishnav, M.D.

Dr. Vaishnav earned his bachelor of science degree in physiology/neuroscience at the University of California, San Diego. He was a member of the Alpha Omega Alpha Honor Society at the University of Southern California, School of Medicine. During his orthopaedic surgery residency, also at the University of Southern California, he assisted with covering the Trojan football and basketball teams. He has been involved in several research projects involving shoulder arthroplasty with meniscal allograft resurfacing of the glenoid, total elbow arthroplasty, and biomechanical evaluation of the native elbow. Dr. Vaishnav has published articles in *The Journal of Shoulder and Elbow Surgery*, *The Journal of Hand Surgery*, and *Foot and Ankle International*. Dr. Vaishnav would like to spend his time in Vail mastering complex reconstructive knee and shoulder surgery. Because of his particular interest in shoulder arthroplasty, he will then spend next year at the San Francisco Shoulder, Elbow, and Hand Institute with Dr. Tom Norris while completing a shoulder and elbow surgery fellowship.

Carl H. Wierks, M.D.

Dr. Wierks studied kinesiology at Wheaton College and stayed in the Chicago area to attend Loyola-Stritch School of Medicine. He then completed his orthopaedic surgery residency at The Johns Hopkins Hospital. His research interests include biceps tendon and rotator cuff repair. One report on the complications of reverse total shoulder replacement was published in *CORR*, presented at the AAOS, and won a Maryland Orthopaedic Association resident research award. He also had the opportunity to provide sports coverage for the Baltimore Orioles baseball team.

Dr. Wierks' greatest achievement by far is recently becoming a father to his twin girls, Ella and Collette. He and his wife, Rebecca, have always enjoyed sports and look forward to some of the outdoor pursuits that Vail has to offer. Dr. Wierks looks forward to honing his ability to diagnose and treat injuries while working with some of the most admired and respected surgeons in orthopaedics.

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 2010/2011 Steadman Philippon Fellowship Class are **Mr. and Mrs. Lawrence Flinn, the Gustafson Foundation** (Biomechanics Research), **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 for their generous support: **Mr. J. Michael Egan, Mr. and Mrs. William Esrey, Mr. and Mrs. Milledge Hart, the Fred and Elli Iselin Foundation, Mr. and Mrs. S. Robert Levine, Mr. and Mrs. Charles McAdam, Ms. Mary Noyes, Mr. and Mrs. Jay Precourt, and Mr. and Mrs. Stewart Turley.**

Answering the Call - Lieutenant Commander Chris Dewing, M.D.

By Jim Brown, Executive Editor

"When I joined the ROTC program in high school, I had no idea that someday I would be in Iraq with a group of Marines," says Dr. Chris Dewing, an orthopaedic surgeon and Lieutenant Commander in the United States Navy who has completed his training in the Steadman Philippon Research Institute Fellowship Program. Iraq was just one of the interesting ports-of-call on Dr. Dewing's journey that eventually brought him to Vail.

"I'm originally from Columbus, Indiana, but my family moved around a lot," Dr. Dewing continues. "We lived in Providence and Memphis, and I spent the last two years of high school in Belgium."

His next stop was at Harvard, where he enrolled with an ROTC scholarship, was a member of the varsity crew, first started thinking about medicine as a career, and graduated magna cum laude. "I was part of a leadership team that took Harvard freshmen on an outdoor program into the Green Mountains of Vermont and Maine. First aid was part of the training program and that got me interested in being a doctor." After Harvard, that interest took him to Columbia University, where he earned his medical degree at Columbia's College of Physicians and Surgeons.

IRAQ CALLING

The timing for his deployment to Iraq was less than ideal. "I was assigned to a Marine battalion and stationed at Camp Pendleton, north of San Diego. My fiancée (Jill) and I were at a premarital counseling retreat in California when I got a call from my colonel, who told me to get back immediately and start administering smallpox vaccinations to the Marines in our battalion before they were deployed to Iraq. I took a deep breath and realized that 'they' included me."

Lieutenant Commander Dewing knew he was going, but he didn't know when. The date turned out to be (1) not good, and (2) not romantic. Instead of getting married on March 15, 2003, as he and Jill had planned, Chris left for Iraq on Valentine's Day a month earlier. Welcome to tough love, Navy style. Their church wedding would have to wait until the end of the year.



Dr. Chris Dewing.

Photo: Tage Plantell

The war in Iraq had just begun and Chris had finished his first year as an intern in general surgery at the Naval Medical Center in San Diego. His title was battalion surgeon, but his role was to provide general medical care for between 600 and 1,000 Marines.

"My battalion was extremely fortunate," Dr. Dewing recalls, "There were times when ambushes occurred ahead of and behind our position, but none of our Marines were seriously injured. Once towns were secured, we set up impromptu medical clinics and started taking care of Iraqi townspeople. The medical system in Iraq had completely collapsed and the people had almost no other option but us."

To add to their misery, Saddam Hussein had drained the area once irrigated by the Tigris and Euphrates rivers and turned it into a dust bowl. "The people were grateful to see us and to get a break from the destitute lives they were leading," says Chris. "We had limited supplies, but we provided a lot of services to the Iraqis."

Dr. Dewing has had time to reflect on his experiences in Iraq. "It's easy for us to forget that there is no fundamental difference in the average American and the average Iraqi. They want the same things

we want — freedom, a better quality of life, and the opportunity to watch their children grow up in a safe environment in a country where conflicts have lasted for hundreds of years."

On his service during that deployment, he says, "I was glad to have the opportunity to serve as a naval officer and doctor in a combat setting, and to serve with the Marines. I've always admired their courage and their leadership. Over the course of our nation's history, a lot of people have made sacrifices to protect our way of life. To be a part of that tradition and put yourself in harm's way was a rewarding experience."

GUANTANAMO ON THE PHONE

Back in the states, Dr. Dewing was supposed to stay in San Diego for a year. But he got another surprise telephone call from the senior naval officer responsible for filling positions all over the world. "I'm in a bit of a bind," the caller said, "and need somebody to go to Guantanamo Bay Naval Base in Cuba for a year. The others under consideration don't have your military background and you'd be a good fit. Would you be willing to do it?"

Dr. Dewing says that when a superior office in the Navy asks you to do some-

thing, you say, “Yessir. Sounds like a great opportunity.” It didn’t hurt that his family, which now included two boys, Everett and Winston, would be allowed to go with Chris and live in Guantanamo also.

“Jill was great about it,” says Chris. “She said if it meant being able to live together as a family rather than being separated, she was all for it. Eventually, we had our third child, Georgianna, while living at the naval base in Cuba.”

“Guantanamo is not a very friendly place. It’s a small, hot, muggy corner of Cuba that has been a point of controversy for 100 years,” says Dewing. “But for those who are deployed there, the military community is very supportive. We lived in a small duplex, had a nice back yard where the boys could play, and the hospital was only three miles away.

“I wore two hats while in Cuba. One was to serve as orthopaedic surgeon for the Naval Base and the other was to be the only surgeon for the Joint Task Force that managed the GITMO Detention Center. I had patients from every branch of the service, as well as civilian contractors, teachers, government agency workers, and a variety of interesting people.

Dr. Dewing also treated detainees. “I felt comfortable treating them, although I always had a security guard and an interpreter, and I had to wear a ‘stab vest’ to protect against the possibility that a patient might try to attack with a knife. We were a little anxious at times because there were rumors that officers might be attacked.

“I will say this about treating those held at the Detention Center: My interaction with them could not be described as friendly, but I felt that I gained their confidence, treated their injuries effectively, and that they appreciated the care they received.

“I never saw detainees being mistreated. In fact, it was more like they were being pampered. A lot of the injuries I took care of were sustained while they were playing soccer, not because the detainees had been beaten by guards. Even though the detention facility has been described as a dark, evil place, that portrayal is not

accurate. I feel the same way about the war in Iraq. There was a huge difference between what we saw on the ground and what was being reported to the rest of the world.”

A CALL FROM DR. RODKEY

The call that brought Dr. Dewing and his family to Vail was from Dr. William Rodkey, Chief Scientific Officer and Director of the Institute’s Basic Science Department. “My obligation to the Navy prevented me from getting my application to the Steadman Philippon Research Institute’s Fellowship Program in on time,” he says, “but I was allowed to interview for one of the positions. It was bitterly cold in Vail, but we were warmly welcomed and had a great time. Shortly thereafter, Dr. Rodkey called and told me I had been accepted as a Fellow for 2008-2009.”

Lieutenant Commander Chris Dewing, M.D., has already had successful military and medical careers that have included difficult assignments, honors, and publications. But his experience at the Clinic and Institute will present a different challenge after his Fellowship ends. “Fellows at the Institute work with the most talented surgeons in the world who are using the most advanced techniques with state-of-the-art equipment. The challenge will be to perform as well and as consistently as these surgeons do when I leave Vail. It’s not as easy as these guys make it look. This experience allows you to jump light years ahead of where you would have been professionally at this point in your career.

“Very few private institutions in the country do as much clinical and biomechanical research as we do here at Steadman Philippon. The quality of the work is unparalleled. Looking ahead, many practices in the field of orthopaedic surgery will have come from ideas and innovations that have been validated by the research conducted at the Institute. That alone should encourage people to continue supporting the Steadman Philippon Research Institute.”



Dr. Chris Dewing in Iraq (left). Dr. Dewing, pictured at Guantanamo Bay Naval Base in Cuba with Jill and holding Georgianna, born at the base, and their two sons Everett (center) and Winston. (right)

Dr. Dewing feels as strongly about the support staff at the Institute as he does the physicians and scientists. “The thing that cannot be said enough is that the people who work with and around these great surgeons are first rate. The receptionists, interns, insurance specialists, trainers, physical therapists, and front office people make it possible for the Clinic and the Institute to put forth such an excellent product. I’ve enjoyed working with all of them. People are familiar with the world-class reputations of the physicians here, but I want them to know that all of these other people work hard to help them make it happen.”

WHAT’S NEXT?

After his fellowship ended at Steadman Philippon, Dr. Dewing returned to the Naval Medical Center in San Diego as Assistant Director of Sports Medicine. He is teaching and training residents, practicing his profession, and continuing some of the research begun at the Institute.

In a few years, he and Jill will have to make a decision about whether to complete 20 years of service with the Navy or to go into private practice. “Whether working in the Navy or in civilian life,” he predicts, “I will be content with a job that allows a balance between work and family.”

But for the next six years you can find the Dewing family in San Diego. Unless he gets another of those telephone calls.

[Editor’s note: U.S. Naval Base Guantanamo Bay is separate from the Detention Center. Although the center is being closed, the Naval Base will remain in operation.]

PRESENTATIONS & PUBLICATIONS



A primary goal of the Institute is to distribute the results of its research. In 2009, principal investigators and Fellows published 92 papers in scientific and medical journals and delivered 228 presentations to a variety of professional and lay audiences worldwide.

PRESENTATIONS

Anavian J, Khanna G, Plocher EK, Wijdicks CA, Cole PA. Progressive Displacement of Scapula Fractures. Poster, *Orthopaedic Research Society (ORS) Annual Meeting*, Las Vegas, Nevada, 2009.*

Anavian J, Wijdicks CA, Schroder LK, Cole PA. Surgical and Functional Outcomes after Operative Management of Displaced Intra-articular Glenoid Fractures. Podium, *Orthopaedic Trauma Association (OTA) Annual Meeting*, San Diego, California, 2009.*

Anavian J, Wijdicks CA, Schroder LK, Cole PA. Surgical and Functional Outcomes after Operative Management of Displaced Intra-articular Glenoid Fractures. Poster, *Minnesota Orthopaedic Society (MOS) Annual Meeting*, Minneapolis, Minnesota, 2009.*

Armitage BM, Wijdicks CA, Tarkin IS, Marek DJ, Zlowodski M, Cole PA. Fracture Mapping of the Scapula: 3D-CT to Establish Location and Frequency of Fracture Patterns. Poster, *American Academy of Orthopaedic Surgery (AAOS) Annual Meeting*, Las Vegas, Nevada, 2009.*

Bernhardson AS, Macalena JA, Griffith CJ, Wijdicks CA, LaPrade RF. The Reproducibility and Repeatability of Valgus Stress Radiographs to Assess Medial Knee Ligament Injuries. Poster, *American Orthopaedic Society for Sports Medicine (AOSSM) Annual Meeting*, Keystone, Colorado, 2009.*

Braun S, Tello TL, Horan MP, Millett PJ. Coracoid Impingement: Is the coracohumeral interval associated with rotator interval pathologies? *ANNA Annual meeting*, San Diego, California, April 30-May 3, 2009.

Braun S, Tello TL, Horan MP, Millett PJ. Lesions of the Biceps Reflection Pulley: Are There Other Common Associated Pathologies? *AOSSM Specialty Day 2009*, Las Vegas, Nevada, February 24, 2009.

Briggs KK. Hip Outcome Scores. *International Society for Hip Arthroscopy*, New York, New York, November 2009.

Briggs KK. Hip Outcome Scores. *Vail Hip Arthroscopy Symposium*, Vail, Colorado, February 2009.

Briggs KK. Outcomes Following Use of an Unloader Brace. *Össur National Sales Meeting*, Dana Point, California, January 2009.

Briggs KK, Matheny LM, Koppersmith D, Rodkey WG, Steadman JR. Psychometric Properties of Lysholm and Tegner Scores for Knee Osteoarthritis in Older Athletes. Poster, *American Academy of Orthopedic Surgeons*, Las Vegas, Nevada, February 2009.

Briggs KK, Matheny LM, Steadman JR. Hylan G-F 20 & Corticosteroid: Expectations of Treatment & Outcomes Six Months Following Treatment. Poster, *American Academy of Orthopedic Surgeons*, Las Vegas, Nevada, February 2009.

Briggs KK, Philippon M, Koppersmith D. Factors Associated with Date of Onset of Symptoms to Surgery in Patients Undergoing Hip Arthroscopy. Poster, *American Academy of Orthopedic Surgeons*. Las Vegas, Nevada, February 2009.

Briggs KK, Rodkey WG, Lysholm J, Tegner Y, Steadman JR. 25 years later: The reliability, validity and responsiveness of the patient-administered Lysholm score and Tegner activity scale for anterior cruciate ligament injuries of the knee. *International Cartilage Repair Society 8th World Congress*, Miami, Florida, May 2009.

Briggs KK, Rodkey WG, Tegner Y, Lysholm J, Steadman JR. 25 years later: The reliability, validity and responsiveness of the patient-administered Lysholm score and Tegner activity scale for anterior cruciate ligament injuries of the knee. *European Federation of National Associations of Orthopaedics and Traumatology (EFORT) 10th Congress*, Vienna, Austria, June 2009.

Briggs KK, Rodkey WG, Steadman JR. Factors associated with failure of meniscus suture repair. *European Federation of National Associations of Orthopaedics and Traumatology (EFORT) 10th Congress*, Vienna, Austria, June 2009.

Briggs KK, Rodkey WG, Steadman JR. Factors associated with failure of meniscus suture repair. Poster, *International Cartilage Repair Society 8th World Congress*, Miami, Florida, May 2009.

Briggs KK, Rodkey WG, Steadman JR. Function and Activity Levels Correlate with Type of Meniscus Tear. *American Academy of Orthopedic Surgeons*, Las Vegas, Nevada, February 2009.

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* These articles were published and presentations were made during 2009, when Robert F. LaPrade, M.D., Ph.D., and Coen Wijdicks, Ph.D., were faculty members in the Department of Orthopaedic Surgery at the University of Minnesota. Dr. LaPrade is now a surgeon at the Steadman Clinic and Director of Biomechanics Research at the Steadman Philippon Research Institute. Dr. Wijdicks is now Deputy Director and Senior Staff Scientist at the Institute.

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Millett PJ. Distal Biceps Avulsion: Diagnosis and Treatment. AAOS/ASES, *The Shoulder and Elbow Surgical Techniques and Management*, Tucson, Arizona, April 23-26, 2009.

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Millett PJ. Rotator Cuff Repair, including management of massive, subscap and partial tears. *Arthrex Shoulder and Total Shoulder Course*, Vail, Colorado, March 20-21, 2009.

Millett PJ. Speed Bridge technique. Live demonstration. *Boston Sports Medicine Symposium*, Boston, Massachusetts, June 11, 2009.

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Millett PJ. Surgical Management of Acute AC Separations. *4th Annual Rocky Mountain Shoulder & Elbow Society Meeting*, Beaver Creek, Colorado, August 7, 2009.

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Philippon MJ. Advanced Hip Arthroscopy: Video Demonstration Labral Reconstruction and Cartilage Repair. *AANA 28th Fall Course*, Palm Desert, California, November 2009.

Philippon MJ. Arthroscopic Augmentation of the Acetabular Labrum. *Everything About the Hip*, Lake Como Italy, June 2009.

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Philippon MJ. Arthroscopic treatment of FAI and labral tears in athletes. *AMSSM/AOSSM*, Tampa, Florida, April 2009.

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Philippon MJ. Arthroscopic Treatment of FAI and Suture Labral Repair. *Everything About the Hip*, Lake Como, Italy, June 2009.

Philippon MJ. Arthroscopic treatment of FAI: technique and outcomes. *KLEOS: Solution Management of Hip Diseases*, Rome, Italy, May 2009.

Philippon MJ. Arthroscopic Treatment of Femoral Acetabular Impingement with Early Outcome. *29th Annual Meeting of the Israel Orthopedic Association*, Tel Aviv, Israel, December 2009.

Philippon MJ. Focus Demonstration: Advances in Hip Arthroscopy. *AANA 28th Fall Course*, Palm Desert, California, November 2009.

Philippon MJ. Extra-Articular Hip Injuries Treated with Arthroscopy. *Everything About the Hip*, Lake Como, Italy, June 2009.

Philippon MJ. Gluteus Medius Muscle Activation During Hip Rehabilitation Exercises. *Podium Co-Author, AOSSM*, Keystone, Colorado, July 2009.

Philippon MJ. Hip Arthroscopy Techniques. *Smith & Nephew Inaugural Fellowship Meeting*, Andover, Massachusetts, September 2009.

Philippon MJ. Hip labral tears: a surgeon's approach to recognition, treatment, and prevention. *Distinguished Lecture Series in Sports Medicine*, Northeastern University, Massachusetts, June 2009.

Philippon MJ. Hip Mini-Fellowship. *AANA 28th Fall Course*, Palm Desert, California, November 2009.

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Philippon MJ. Is There a Role of Hip Arthroscopy in Dysplasia. *AO Symposium on Surgical Preservation of the Hip*, Lake Tahoe, California, January 2009.

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Philippon MJ. Labral Repair and Outcomes in Athletes. *AANA Master's Course*, Rosemont, Illinois, July 2009.

Philippon MJ. Labral Tears and Hip Pathology in Athletes and Active Patients. *Northwestern University Grand Rounds*, Chicago, Illinois, September 2009.

Philippon MJ. Labral Transplants: Basic Research and Clinical Results. *AO Symposium on Surgical Preservation of the Hip*, Lake Tahoe, California, January 2009.

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Philippon MJ. Minimum 2-year follow-up in the treatment of FAI with hip arthroscopy. *Vail Hip Arthroscopy Symposium*, Vail, Colorado, February 2009.

Philippon MJ. New frontiers in hip arthroscopy. *Mt. Sinai Grand Rounds*, Sinai Hospital, New York, May 2009.

Philippon MJ. Os Acetabuli: treatment options. *Santander Arthroscopy and Sports Hip Meeting*, Santander, Spain, February 2009.

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Philippon MJ. Outcome of FAI in athletes. *Vail Hip Arthroscopy Symposium*, Vail, Colorado, February 2009.

Philippon MJ. Partial femoral head resurfacing. *Santander Arthroscopy and Sports Hip Meeting*, Santander, Spain, February 2009.

Philippon MJ. Peripheral Compartment: Cam Impingement, Pincer Impingement and Instability. *Instructional Course Lecture*, AOSSM, Keystone, Colorado, July 2009.

Philippon MJ. Pincer Impingement Concepts. *AANA Master's Course*, Rosemont, Illinois, July 2009.

Philippon MJ. Pincer Impingement Concept & Labrum Repair/ Re-fixation, *AANA Masters Experience, Master Instructor*, Chicago, Illinois, October 2009.

Philippon MJ. Pincer impingement: rim trimming via labral takedown/refixation. *AANA Annual Meeting*, San Diego, California, May 2009.

Philippon MJ. Pincer Treatment and Labral Refixation. *Virtual Webinar per Roman Giverts*, www.vumedi.com, January 2009.

Philippon MJ. Revision cases and ten pearls in ten minutes. *Santander Arthroscopy and Sports Hip Meeting*, Santander, Spain, February 2009.

Philippon MJ. Risk factors of the young tennis player's hip and prevention. *11th World Congress of Sports Medicine and Science in Tennis*, Valencia, Spain, November 2009.

Philippon MJ. Role of the Scope: Indications and Results for Femoral/CAM FAI. *AO Symposium on Surgical Preservation of the Hip*, Lake Tahoe, California, January 2009.

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Register B, Karas S. Biologic Augmentation of Rotator Cuff Repairs—Current State of the Art. *Orthopedic Learning Center*, Rosemont, Illinois, January 2009.

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Register B, Pendleton A, Karas S. Outcomes after allograft augmentation of massive rotator cuff tears. *Eastern Orthopedic Association's Annual Meeting*, Nassau, The Bahamas, June 18-20, 2009.

Rodkey WG. Biologic enhancement of meniscus repair. What are the options? Key-note lecture (vice S.P. Arnoczky). *American Orthopaedic Society for Sports Medicine (AOSSM) Annual Meeting*, Keystone, Colorado, July 9-12 2009.

Rodkey WG. Biomaterials in joint repair and reconstruction. *International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine (ISAKOS)*, Osaka, Japan, April 2009.

Rodkey WG. Meniscus regeneration using Collagen Meniscus Implants (CMI, "Menaflex"[®]). *Invited lecturer*. The Royal London Hospital, University of London, London, England, January 2009.

Rodkey WG. Meniscus implants work better! Collagen Meniscus Implants ("Menaflex"[®]): 5- to 6-year follow-up results. *The Great Debate*, London, England, January 2009.

Rodkey WG. Meniscus regeneration and substitution. *International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine (ISAKOS)*, Osaka, Japan, April 2009.

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Rodkey WG. Microfracture in young patients. *Barcelona Knee Meeting 2009*, Barcelona, Spain, February 2009.

Rodkey WG. Microfracture: The scientific and clinical basis. *Invited lecturer*. The Royal London Hospital, University of London, London, England, January 2009.

Rodkey WG. Multiple topics. *Invited guest*. Imperial College of London, London, England, January 2009.

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Rodkey WG. Prevention of Post-Meniscectomy Syndrome: Collagen Meniscus Implants work better than metal and plastic! 5- to 6-year follow-up results with Menaflex[®]. *Barcelona Knee Meeting 2009*, Barcelona, Spain, February 2009.

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In the Media

USA Today featured the Institute, Dr. Marc J. Philippon, and Dr. Richard Steadman in the February 22 article, *Athletes Embrace Cutting-Edge Doctors, Methods To Speed Recovery*, by Jorge L. Ortiz

Both doctors and the Institute were prominently featured throughout the article and in the side-bar, *Doctors Athletes Rely On*:

Knees: Richard Steadman. A pioneer in microfracture surgery and the co-founder of the renowned Steadman Clinic in Vail, Colo. Much sought-after by skiers and soccer players. Patients have included Joe Montana, Bruce Smith, Kobe Bryant, and Carlos Beltran.

Hips: Marc Philippon. A consultant to teams in the four major sports, Philippon has advanced the use of joint-preservation techniques through arthroscopic hip surgery. His patients have included Alex Rodriguez, Greg Norman, Mario Lemieux, and Kurt Warner.

In addition, researchers at the Steadman Philippon Research Institute in Vail, recently concluded a study on the effects of stem cells on cartilage regeneration.

The January 13 and 14 issues of the *New York Times* covered the story of New York Mets center fielder Carlos Beltran, who underwent arthroscopic knee surgery by Dr. Steadman. In the January 13 article, *Surgery for Beltran Means He's Likely Out Until May*, journalist Ben Shpigel writes:

The Mets said that it was Beltran's decision and that his "personal physician," Dr. Richard Steadman, a noted orthopedist, performed the surgery in Colorado.

During the Winter Olympics, The *Wall Street Journal* journalist Matthew Futterman cited Institute VP for Program Advancement and former US Ski Team coach John McMurtry in articles February 13, *The Old Men on the Mountains*, and February 18, *The Americans Win Another Rodeo*.

In an event such as the Olympics, with so much at stake, the mental aspect can and usually is the deciding factor, said former U.S. Alpine Coach John McMurtry. Very often the favorites in the Olympics falter and a dark horse breaks through. The favorites carry the burden of expectations, which can factor into the final result. Lindsey (Vonn) is a tremendous athlete and is physically and mentally dominant. She radiates confidence.

Recognition



Dr. Steadman receives Lifetime Achievement Award from David Levine, M.D., Vice-President, Clinical Research, Genzyme Corporation, middle, and Bert Mandelbaum, M.D., President, International Cartilage Repair Society, at the 8th World Congress of the International Cartilage Repair Society, May 23-26, Miami, Florida.

International Cartilage Repair Society Honors Dr. Steadman

At the 8th World Congress of the International Cartilage Repair Society (ICRS), May 23-26, in Miami, Florida, Dr. Richard Steadman was awarded the Lifetime Achievement

Award. He was recognized for his lifelong devotion to cartilage research and cartilage repair, and for contributing to our knowledge base of cartilage and patient care. Past recipients include Drs. Lars Peterson, Allan Gross, and Arnold Caplan. The ICRS was founded in 1997 in Switzerland with the purpose of promoting research and exchange of knowledge among physicians, scientists, patients and researchers in the field of cartilage repair. The ICRS has 950 members from 57 countries. Approximately 1,000 participants from 60 countries attended the 2009 World Congress in Miami.

Dr. Rodkey Named to Research Committee of the American Orthopaedic Society for Sports Medicine (AOSSM)

As further evidence of the worldwide influence of the Institute in orthopaedic research and education, the leadership of AOSSM has invited Dr. William G. Rodkey, the Institute's Chief Scientific Officer and Director of Basic Science Research, to serve as a member of its Research Committee. The AOSSM is



an association of orthopaedic surgeons and a world leader in sports medicine education, research, and communication. The mission of the Research Committee is to promote and facilitate applied basic science and clinical research in musculoskeletal injuries and conditions common in sports.

American College of Sports Medicine, Rocky Mountain Chapter, Selects J. Erik Giphart Ph.D., as President

In February, Steadman Philippon Research Institute Senior Staff Scientist J. Erik Giphart, Ph.D., became the acting President of the Rocky Mountain Chapter of the American College of Sports Medicine (RMACSM). Erik was elected at the Annual Meeting in 2008 and will serve a total of three years on the Governing Board.



The Rocky Mountain Chapter is the regional chapter of American College of Sports Medicine and consists of over 200 academic, medical, professional, and student members in the Colorado and Wyoming area. Visit <http://www.rmascsm.org/> for more information.

The American College of Sports Medicine is the largest sports medicine and exercise science organization in the world, and has more than 35,000 international, national, and regional chapter members from 75 countries. ACSM was founded in 1954. Since that time, ACSM members have applied their knowledge, training, and dedication in sports medicine and exercise science to promote healthier lifestyles for people around the globe. Visit <http://www.acsm.org/> for more information.

American Academy of Orthopaedic Surgeons (AAOS) Recognizes Dr. Peter Millett

Congratulations to Dr. Millett for being the inaugural recipient of the AAOS Achievement Award. The spirit of this new recognition program is to encourage and celebrate active volunteer involvement by our membership.

In a letter to Dr. Millett, Dr. Joseph Zuckerman, AAOS president, wrote, "It is indeed an honor for me to recognize Academy members like yourself whose volunteer efforts support our colleagues, the Academy and the orthopaedic profession. You and the other Academy Fellows who give of yourselves are the reason for the strength of the Academy in all of its endeavors, as well as the world of orthopaedics."

Institute Research Leads the World Biomechanics Research Team Shines at ESSKA



From left to right: Lars Engebretsen, Chad Griffith, Steinar Johansen, Coen Wijdicks, Colin Anderson, and Rob LaPrade

Listed below are the awards that our research team received at the 14th European Society of Sports Traumatology, Knee Surgery, and Arthroscopy (ESSKA) Annual Congress, Oslo, Norway, June 9-12, 2010. It was the culmination of a great amount of hard work and they all shined in their presentations in Oslo. This meeting was the largest sports medicine meeting ever in the world, and our team had 22 separate presentations and 9 posters. These types of honors did not come without a great deal of work from everyone on our research team and collaboration from our great Norwegian colleagues and friends.

BEST POSTER AWARD

Griffith CJ, LaPrade RF, Pepin SR, Wijdicks CA, Goerke U, Michaeli S, Ellermann J.

Untreated posterolateral knee injuries: biomechanical and MRI evaluation of in vivo canine model.

- This award is given to the best poster accepted for display at the ESSKA biannual meeting.

THE NICOLA'S FOUNDATION YOUNG RESEARCHER AWARD

Wijdicks CA, Ewart DT, Nuckley DJ, Johansen S, Engebretsen L, LaPrade RF. *Mechanical Properties of the Primary Medial Knee Structures.* 14th European Society of Sports Traumatology, Knee Surgery, and Arthroscopy (ESSKA) Annual Congress, Oslo, Norway, June 9-12, 2010.

- This award is given to the best scientific manuscript in the fields of Knee Surgery, Sports Traumatology and Arthroscopy presented by a researcher less than 40 years of age.

SMITH & NEPHEW BEST PAPER IN LIGAMENTS AND BIOMECHANICS AWARD

Anderson CJ, Westerhaus BD, Pietrini SD, Ziegler CJ, Wijdicks CA, Johansen S, Engebretsen L, LaPrade RF. *The Impact of Anteromedial and Posterolateral Bundle Graft Fixation Angles in Double-Bundle Anterior Cruciate Ligament Reconstructions.*

- This award is given to the best scientific manuscript in the fields of ligament healing and biomechanics in orthopaedic sports medicine.

Karen Briggs, M.B.A., M.P.H., Director of Clinical Research, reports that 2010 will be another prolific year for the Institute as numerous papers have been accepted by prestigious medical and scientific societies and journals.

2010 Annual Meeting of the American Academy of Orthopaedic Surgeons

The 77th Annual Meeting of the American Academy of Orthopaedic Surgeons (AAOS), New Orleans, March 9-13, accepted four podium and four poster presentations highlighting Institute 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.

Podium Presentations

Use of an Unloader Brace for Medial or Lateral Compartment Osteoarthritis Of The Knee.

Tegner Index and Lysholm Scores Assess Activity and Function 6 Years Post Collagen Meniscus Implants.

Outcomes Following Arthroscopic Labral Repair in the Hip: Prospective Minimum 2-Year Follow-Up.

Relationship Between the FABER Test and the Radiographic Alpha-Angle In Patients With FAI.

Poster Presentations

Outcomes Following Hip Arthroscopy With Microfracture.

Decreased Femoral Head-Neck Offset Maybe a Possible Risk Factor for ACL Injury.

Outcomes of Displaced Clavicle Fractures: Non-Operative Vs. Intramedullary Fixation.

Decision-Making in Treating Diaphyseal Clavicle Fractures: Is There Agreement Among Surgeons?

2010 Arthroscopy Association of North America, May 20-23, Hollywood, Florida

The Arthroscopy Association of North America (AANA) is an accreditation council for continuing medical education. AANA exists to promote, encourage, support, and foster the development and dissemination of knowledge of arthroscopic surgery in order to improve upon the diagnosis and treatment of diseases and injuries of the musculoskeletal system.

AANA accepted the following presentations:

Optimization of Magnetic Resonance Imaging of the Anterior Bundle of the Ulnar Collateral Ligament: A Randomized Controlled Trial Of 3 Patient Positions.

Subcoracoid Impingement: Factors Associated With the Size and Location of the Coracohumeral Interval.

The following research will be presented at AANA as e-posters:

Hip Arthroscopy in the Patient 50 Years and Older.

New Method To Assess CAM Impingement and the Risk of Chondral Damage Using AP Pelvis Radiographs.

European Society of Sports Traumatology, Knee Surgery, and Arthroscopy (ESSKA) presents major award and recognition at the 14th Congress 2010, Oslo, Norway

TWO "STAR PAPERS" COMPETE FOR BEST PAPER OF THE ESSKA CONGRESS 2010, JUNE 10.

As evidence that Institute research is leading the world, Coen Wijdicks, Ph.D., Deputy Director, Biomechanics Research Laboratory, was recently awarded (June 12) The Nicola Foundation Young Researcher Award. The award is given to the best scientific manuscript in the fields of Knee Surgery, Sports Traumatology and Arthroscopy presented by a researcher under 40 years of age at the 14th ESSKA Congress 2010. The paper is titled, "Mechanical Properties of the Primary Medial Knee Structures."

Also at the Congress, two papers, one by Karen Briggs, M.B.A., M.P.H., Director of Clinical Research, and one by Dr. Wijdicks, are among six finalists "Star Papers" out of a total of 1,088 submitted abstracts to compete for the best paper of the ESSKA Congress 2010. The papers are *Analysis of scores to document outcome following hip arthroscopy, Briggs K., Philippon M.; and Mechanical properties of the primary medial knee structures, Wijdicks C., Ewart D., Nuckley D.*

Subcoracoid Impingement: Factors Associated With a Narrow Coracohumeral Interval in Patients Who Underwent Coracoidplasty.

Comprehensive Arthroscopic Management (CAM) of Shoulder Osteoarthritis in Young Active Patients.

2010 European Society of Sports Traumatology, Knee Surgery and Arthroscopy Annual Meeting, June 9-12, Oslo, Norway

The European Society of Sports Traumatology, Knee Surgery and Arthroscopy (ESSKA) promotes the exchange of information data covering research into the scientific and practical aspects of knee ailments. ESSKA accepted the following five podium and two poster presentations for the annual meeting.

Podium Presentations:

Knee Outcomes Data Collection in a Sports Medicine Practice With a One-Page Form.

Analysis of Scores To Document Outcome Following Hip Arthroscopy Meniscus Tear Types and Patterns Correlate With Function and Activity Levels at Least Two Years After Partial Meniscectomy.

Function and Return to Activity Outcomes Six Years After Partial Meniscectomy Vs. Collagen Meniscus Implants Assessed With Lysholm Scores and Tegner Index.

Hip Arthroscopy in the Patient 50 Years and Older.

Poster Presentations:

Viscosupplementation Injections Augmented with Corticosteroid for Knee Osteoarthritis: Patient Expectations and Clinical Outcomes.

Use of an Unloader Brace for Medial or Lateral Compartment Osteoarthritis of the Knee.

Biomechanics Research Laboratory had 19 abstracts accepted by the Orthopaedic Research Society for its 2010 annual meeting and one abstract was accepted by the Society of Military Orthopaedic Surgeons for its annual meeting.

2010 Annual Meeting of the Society of Military Orthopaedic Surgeons (SOMOS) Annual Meeting, December 13-17, 2010, Vail, Colorado

The purpose of the Society of Military Orthopaedic Surgeons is to provide a forum for the interchange of medical knowledge as it relates to the practice of orthopaedic surgery in the military. SOMOS shall hold at least one general meet-

ing each year. The annual meeting is primarily of a scientific nature. Previous conferences have generated over 500 in attendance.

SOMOS accepted the following abstract for presentation:

Does Biceps Tenodesis Alter Shoulder Kinematics? A Novel Approach In Vivo Biplane Fluoroscopy Study. C. Dewing, M.D., M.C., U.S.N.; F. Elser, M.D.; JE Giphart, Ph.D.; J. Krong, M.S.; D. Peterson, M.S.; MR Torry, Ph.D.; PJ Millett, Ms.C., M.D.

56th Annual Meeting of the Orthopaedic Research Society, March 6-9, New Orleans

The Orthopaedic Research Society (ORS) is dedicated to the advancement of orthopaedic research and to the translation of basic and clinical research to clinical practice. The ORS carries out this mission primarily by disseminating knowledge and by promoting the development of basic and clinical scientists. The ORS also advocates for increased resources for research and increases public awareness of the impact of orthopaedic research.

ORS has accepted the following 19 abstracts for presentation:

Deep Hip Muscle Function During Gait. Decker MJ, Krong J, Peterson DS, Torry MR, Philippon MJ.

Temporal Predictors of Anterior Tibial Translation in Healthy Adults. Peterson DS, Shelburne KB, Giphart JE, Krong J, Steadman JR, Torry MR.

In Vivo Knee Kinematics Under Increasing Demand of Functional Activities: A Bi-Plane Fluoroscopic Assessment. Torry MR, Shelburne KBN, Peterson DS, Krong J, Giphart JE, Steadman, JR.

Method for Determining Scapulo Thoracic Motion in the Lat Pulldown in Healthy Subjects Using Bi-Plane Fluoroscopy. Anker CR, Shelburne KB, Hackett TR, Duffy P, Peterson DS, Krong J, Hageman L, North A, Torry MR, Giphart JE.

Tibio-Femoral Kinematics Of Soft And Stiff Landings: A Bi-Plane Fluoroscopic Study. Peterson DS, Shelburne KB, Giphart JE, Krong J, Steadman JR, Torry MR.

The Relationship of Lower Extremity Alignments, Knee Laxity And Anterior Tibial Translation During Drop Landings: A Bi-Plane Fluoroscopic Study. Torry MR, Peterson DS, Shelburne KB, Krong J, Giphart JE, Steadman JR, Woo S L-Y.

Hip Rotation Function of the Pectineus Muscle. Decker MJ,

Krong J, Hageman LR, Torry MR, Philippon MJ (2010), Torry MR, Peterson DS, Shelburne KB, Krong J, Giphart JE, Steadman JR, Woo S L-Y.

Thigh Strength Does Not Correlate With Anterior Tibial Translation During Drop Landings: A Bi-Plane Fluoroscopic Study. Torry MR, Peterson DS, Shelburne KB, Krong J, Giphart JE, Steadman JR, Woo S L-Y.

A Comparison of Muscle Contributions to Belly Press and Lift Off Tests With Simulated Obesity. Yanagawa T, Torry MR, Shelburne KB, Hackett TR, Pandey MG.

Comparison of Two Normalization Schemes for Knee Kinematics Derived from Bi-Plane Fluoroscopy. Peterson DS, Shelburne KB, Giphart JE, Krong J, Steadman JR, Torry MR.

In Vivo Tibia-Femoral Contact Patterns in the Natural Knee During Jump Landing. Clary CW, Laz PJ, Giphart JE, Torry MR, Rullkoetter PJ, Shelburne KB.

A Musculoskeletal Model of the Hip for the Calculation of Muscle and Joint Loads During Physical Activity. Shelburne KB, Decker MJ, Philippon MJ, Torry MR.

Hip Joint Forces During Squatting Exercise Predicted With Subject Specific Modeling. Shelburne KB, Decker MJ, Philippon MJ, Torry MR.

Muscle Forces at the Hip During Squatting Exercise. Shelburne KB, Decker MJ, Philippon MJ, Torry MR.

Anterior Hip Muscle Forces During Ice Hockey Sprint Starts. Shelburne KB, Torry MR, Krong J, Decker MJ, Philippon MJ.

Effect of Long Head Biceps Tenodesis on In Vivo Glenohumeral Translations During Loaded Forward Flexion Using Biplane Fluoroscopy. Giphart JE, Millett PJ, Dewing CB, Elser F, Peterson DS, Krong J, Hageman E, North A, Torry MR.

Effect of Clavicle Shortening on In Vivo Acromioclavicular Rotations During Lat Pull Downs Using Bi-Plane Fluoroscopy. Giphart JE, Shelburne KB, Hackett TR, Duffy P, King J, Peterson DS, Krong J, Hageman E, North A, Torry MR.

Muscle and Joint Loading at the Shoulder During the Forward Punch Rehabilitation Exercise. Yanagawa T, Torry MR, Shelburne KB, Hackett TR, Pandey MG.

Comparison of Six Degrees of Freedom Glenohumeral Kinematics During Abduction, Scaption And Forward Flexion In Healthy Subjects Using Biplane Fluoroscopy. Giphart JE, Millett PJ, Anstett T, Brunkhorst JP, Peterson DS, Krong J, Shelburne KB, Torry MR.

Vail Hip Arthroscopy Symposium

Smith & Nephew Endoscopy and Dr. Marc J. Philippon of the Steadman Clinic and the Steadman Philippon Research Institute hosted the 3rd Vail Hip Arthroscopy Symposium at the Vail Cascade. More than 100 physicians from the United States and abroad attended the symposium held March 17-20. With some of the top hip arthroscopists in the world, the faculty included Marc Philippon, M.D.; J.W. Thomas Byrd, M.D. (Nashville, Tenn); Richard Villar, F.R.C.S. (London, England), Thomas Sampson, M.D. (San Francisco, CA), Victor Ilizaliturri, M.D., (Mexico City, Mexico), Joseph McCarthy, M.D., (Boston, MA), Robert Buly, M.D., (New York, NY), and Carlos Guanche, M.D., (Los Angeles, CA). The first two days of the conference consisted of faculty presentations and discussions, followed by a day of cadaveric lab demonstrations. Topics included the latest techniques and approaches to hip arthroscopy, femoroacetabular impingement, labral repair, microfracture in the hip, and outcomes research.





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 nationally 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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President and Chief Executive Officer

Marc Prisant

Executive Vice President and Chief Financial Officer

William G. Rodkey, D.V.M.

Chief Scientific Officer

Amy Ruther

Human Resources and Accounting Manager

DEVELOPMENT

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Vice President for Program Advancement

Jim Brown, Ph.D.

Executive Editor

Sheri Wharton

Director of Special Events

Maricela Pinela

Development Associate

BASIC SCIENCE

William G. Rodkey, D.V.M.

Director

BIOMECHANICS RESEARCH

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

Director

Coen A. Wijdicks, Ph.D.

Deputy Director

J. Erik Giphart, Ph.D.

Senior Staff Scientist

Kyle Jansson, B.S.

Research Engineer

Casey Myers

Intern

Wes Pennington

Intern

Jean-Eves Schoenahl, M.D.

European Visiting Scholar

CLINICAL RESEARCH

Karen K. Briggs, M.B.A., M.P.H.

Director

Kira Barclay

Research Associate

Leandro Enjisman, M.D.

Brazilian Visiting Scholar

Marilee Horan, M.P.H.

Research Associate

Lauren Matheny

Research Associate

Chris Pizzo

Research Associate and Bioskills Coordinator

Mackenzie Herzog

Intern

Brian Maxwell

Intern

IMAGING RESEARCH

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

Director

EDUCATION

Greta Campanale

Coordinator

INFORMATION SERVICES

Joe Kania

Coordinator

Barry Eckhaus

Coordinator

Independent Auditors' Report

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

We have audited the accompanying statements of financial position of Steadman Philippon Research Institute (the "Institute") (a Colorado non-profit corporation) as of December 31, 2009 and 2008, and the related statements of activities, functional expenses, and cash flows for the years then ended. These financial statements are the responsibility of the Institute's management. Our responsibility is to express an opinion on these 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 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 includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of Steadman Philippon Research Institute as of December 31, 2009 and 2008, and the results of its activities and its 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

June 16, 2010
Denver, Colorado

Statements of Financial Position

December 31, 2009

ASSETS

| | December 31 | |
|---|---------------------|---------------------|
| | 2009 | 2008 |
| Current assets | | |
| Cash and cash equivalents | \$ 1,755,593 | \$ 1,813,945 |
| Accounts receivable | - | 105 |
| Accounts receivable, related parties | 1,673 | 807 |
| Contributions receivable, current portion (Note 3) | 131,400 | 106,400 |
| Contributions receivable, related parties | 750 | 750 |
| Prepaid expenses and other assets | 2,014 | 2,281 |
| Investments (Note 2) | 4,292,010 | 3,204,453 |
| Total current assets | 6,183,440 | 5,128,741 |
| Contributions receivable, less current portion (Note 3) | 115,026 | 209,352 |
| Property and equipment, net (Note 4) | 2,591,539 | 2,380,128 |
| Investments - other | 227,050 | - |
| Total assets | \$ 9,117,055 | \$ 7,718,221 |

LIABILITIES AND NET ASSETS

| | | |
|---|---------------------|---------------------|
| Current liabilities | | |
| Accounts payable | \$ 39,312 | \$14,003 |
| Accrued expenses | 233,336 | 126,487 |
| Line-of-credit (Note 5) | 15,1463 | 2,036 |
| Current portion of long-term debt (Note 6) | 10,339 | - |
| Current portion of capital leases (Note 7) | 417,007 | 238,083 |
| Current portion of deferred rent | 153,622 | - |
| Total current liabilities | 868,762 | 410,609 |
| Long-term liabilities | | |
| Long-term debt, net of current portion (Note 6) | 18,358 | - |
| Deferred rent, net of current portion | 1,422,529 | 1,839,536 |
| Capital leases, net of current portion (Note 7) | 460,866 | - |
| Total liabilities | 2,770,515 | 2,250,145 |
| Commitments | | |
| Net assets | | |
| Unrestricted | 5,498,046 | 4,261,204 |
| Temporarily restricted (Note 9) | 848,494 | 1,206,872 |
| Total net assets | 6,346,540 | 5,468,076 |
| Total liabilities and net assets | \$ 9,117,055 | \$ 7,718,221 |

See Notes to Financial Statements

Statements of Activities

| | For the Years Ended | | | | | |
|---|---------------------|---------------------------|---------------------|---------------------|---------------------------|---------------------|
| | December 31, 2009 | | | December 31, 2008 | | |
| | Unrestricted | Temporarily Restricted | Total | Unrestricted | Temporarily Restricted | Total |
| REVENUES, GAINS, AND OTHER SUPPORT | | | | | | |
| Contributions | \$ 1,385,633 | \$ 392,676 | \$ 1,778,309 | \$ 1,289,271 | \$ 1,017,880 | \$ 2,307,151 |
| Grants | - | 34,871 | 34,871 | - | - | - |
| Corporate sponsors | 519,140 | 538,666 | 1,057,806 | 796,509 | 429,570 | 1,226,079 |
| Fundraising events | 285,171 | - | 285,171 | 397,700 | - | 397,700 |
| Fellows and other meetings | - | - | - | 3,100 | - | 3,100 |
| Bioskills lab | 40,541 | - | 40,541 | 30,550 | - | 30,550 |
| Video income | 3,759 | - | 3,759 | 2,080 | - | 2,080 |
| MRI and other income | 1,133,092 | - | 1,133,092 | 49,509 | - | 49,509 |
| Total revenues, gains, and other support | 3,367,336 | 966,213 | 4,333,549 | 2,568,719 | 1,447,450 | 4,016,169 |
| Net assets released from restrictions | 1,324,591 | (1,324,591) | - | 1,380,406 | (1,380,406) | - |
| Total revenues, gains, and other support | 4,691,927 | (358,378) | 4,333,549 | 3,949,125 | 67,044 | 4,016,169 |
| Expenses and losses | | | | | | |
| Biomechanics research | 926,174 | - | 926,174 | 796,272 | - | 796,272 |
| Basic science | 246,266 | - | 246,266 | 204,940 | - | 204,940 |
| Bioskills and education | 432,392 | - | 432,392 | 372,591 | - | 372,591 |
| Clinical research | 661,966 | - | 661,966 | 611,693 | - | 611,693 |
| Information services | 197,534 | - | 197,534 | 210,585 | - | 210,585 |
| Imaging research | 607,930 | - | 607,930 | 174,455 | - | 174,455 |
| Management and general | 487,919 | - | 487,919 | 420,215 | - | 420,215 |
| Fundraising | 593,087 | - | 593,087 | 660,978 | - | 660,978 |
| Total expenses and losses | 4,153,268 | - | 4,153,268 | 3,451,729 | - | 3,451,729 |
| Other income (expense) | | | | | | |
| Investment return | 755,103 | - | 755,103 | (1,034,109) | - | (1,034,109) |
| Interest expense | (56,920) | - | (56,920) | (24,730) | - | (24,730) |
| Total other income (expense) | 698,183 | - | 698,183 | (1,058,839) | - | (1,058,839) |
| Change in net assets | 1,236,842 | (358,378) | 878,464 | (561,443) | 67,044 | (494,399) |
| Net assets at beginning of year | 4,261,204 | 1,206,872 | 5,468,076 | 4,822,647 | 1,139,828 | 5,962,475 |
| Net assets at end of year | \$ 5,498,046 | \$ 848,494 | \$ 6,346,540 | \$ 4,261,204 | \$ 1,206,872 | \$ 5,468,076 |

See Notes to Financial Statements

Statements of Cash Flows

| | For the Year Ended December 31 | |
|--|--------------------------------|---------------------|
| | 2009 | 2008 |
| Cash flows from operating activities | | |
| Change in net assets | \$ 878,464 | \$ (494,399) |
| Adjustments to reconcile change in net assets to net cash provided by operating activities | | |
| Depreciation and amortization expense | 601,970 | 197,505 |
| Net (gain) loss on investments | (743,500) | 1,086,045 |
| Donated real estate | (227,050) | - |
| Donated stock | (15,000) | - |
| Amortization of deferred rent | (153,622) | - |
| Changes in assets and liabilities | | |
| Accounts receivable | (761) | 48,149 |
| Contributions receivable | 69,326 | 16,355 |
| Prepaid expenses and other assets | 267 | 13,628 |
| Accounts payable | 25,309 | (152,460) |
| Accrued expenses | 106,849 | 19,172 |
| Deferred revenues | - | (20,023) |
| | (336,212) | 1,208,371 |
| Net cash provided by operating activities | 542,252 | 713,972 |
| Cash flows from investing activities | | |
| Purchase of investments | (919,016) | (30,872) |
| Proceeds from sale of investments | 589,959 | 82,867 |
| Additions to buildings and equipment | (45,271) | (318,730) |
| Net cash used in investing activities | (374,328) | (266,735) |
| Cash flows from financing activities | | |
| Payments on capital leases | (238,083) | (85,220) |
| Payments on long-term debt | (3,339) | - |
| Borrowings from line-of-credit | 15,146 | 32,036 |
| Net cash used in financing activities | (226,276) | (53,184) |
| Net (decrease) increase in cash and cash equivalents | (58,352) | 394,053 |
| Cash and cash equivalents at beginning of year | 1,813,945 | 1,419,892 |
| Cash and cash equivalents at end of year | \$ 1,755,593 | \$ 1,813,945 |

Supplemental disclosure of cash flow information:

Cash paid for interest was \$56,920 and \$24,730 for the years ended December 31, 2009 and 2008, respectively.

Supplemental disclosure of non-cash activity:

During the year ended December 31, 2009, the Institute recorded \$768,110 of additions to leasehold improvements that were recorded as deferred rent concessions paid by the landlord.

During the year ended December 31, 2009, \$32,036 of the outstanding balance on the line-of-credit was converted to a note payable.

During the year ended December 31, 2008, the Institute acquired \$1,714,990 of equipment through capital leases.

See Notes to Financial Statements

Statement of Functional Expenses

For the Year Ended December 31, 2009

| | Biomechanics Research | Basic Science | Bioskills and Education | Clinical Research | Information Services | Imaging Research | Total | Management and General | Fundraising | Total |
|---|-----------------------|---------------|-------------------------|-------------------|----------------------|------------------|--------------|------------------------|-------------|--------------|
| Salaries and benefits | \$ 641,481 | \$ 6,548 | \$ 132,380 | \$ 513,788 | \$ 117,766 | \$ 96,238 | \$ 1,508,201 | \$ 345,074 | \$ 141,410 | \$ 1,994,685 |
| Consulting and contract labor | 19,820 | 96,000 | 440 | 21,103 | 2,070 | 50,884 | 190,317 | 4,307 | 95,803 | 90,427 |
| Supplies (office, computer, lab) | 36,891 | - | 102,061 | 15,233 | 10,117 | 696 | 164,998 | 3,940 | 6,819 | 175,757 |
| Events and fundraising | 17 | - | 7 | 20 | 7 | - | 51 | - | 115,685 | 115,736 |
| Printing | 3,668 | - | 54 | 6,827 | 97 | 207 | 10,853 | 394 | 112,016 | 123,263 |
| Maintenance and supplies | 20,268 | - | 2,690 | 7,134 | 11,601 | 1,058 | 42,751 | 5,056 | 3,890 | 51,697 |
| Rent and leases | 19,668 | 7,264 | 17,750 | 10,439 | 19,286 | 38,064 | 112,471 | 2,629 | 3,334 | 118,434 |
| Telephone and utilities | 34,526 | - | 25,254 | 19,504 | 13,674 | 17,217 | 110,175 | 12,216 | 4,707 | 127,098 |
| Travel | 10,877 | 2,199 | - | 16,136 | 467 | 1,692 | 31,371 | 17,187 | 10,824 | 59,382 |
| Legal and accounting | 25,234 | - | 8,404 | 14,582 | 3,507 | 924 | 52,651 | 9,419 | 5,392 | 67,462 |
| Fellows | - | - | 39,363 | - | - | - | 39,363 | - | - | 39,363 |
| Education meetings/lectures | - | - | 8,403 | - | - | - | 8,403 | - | - | 8,403 |
| Direct mail/planned giving | - | - | - | - | - | - | - | - | 68,576 | 68,576 |
| Meals and entertainment | 2,869 | 397 | 8,435 | 3,651 | 380 | 1,900 | 17,632 | (1,094) | 1,131 | 7,669 |
| Gifts | 2,953 | 1,639 | 328 | 3,570 | 656 | 328 | 9,474 | 2,405 | 2,018 | 13,897 |
| Postage | 512 | 91 | 12,618 | 11,614 | 722 | - | 25,557 | 1,625 | 9,345 | 36,527 |
| Insurance | 710 | - | 48 | 799 | - | 67 | 1,624 | 58,577 | 92 | 60,293 |
| Meeting fees/registrations and dues and subscriptions | 5,714 | 100 | 10,375 | 4,329 | 149 | - | 20,667 | 1,700 | 1,122 | 23,489 |
| Bank/credit card fees | - | - | - | - | - | - | - | 14,539 | - | 14,539 |
| Meetings (Board and SAC) | - | 2,108 | - | - | - | - | 2,108 | 274 | - | 2,382 |
| Grant writing/medical editing | - | - | - | - | - | - | - | - | 9,000 | 9,000 |
| Research grant | - | 129,920 | - | - | - | - | 129,920 | - | - | 129,920 |
| Advertising | - | - | 90 | 464 | - | - | 554 | 2,745 | - | 3,299 |
| Depreciation and amortization | 825,208 | 246,266 | 368,700 | 649,193 | 180,499 | 209,275 | 2,479,141 | 480,993 | 591,164 | 3,551,298 |
| Total | \$ 926,174 | \$ 246,266 | \$ 432,392 | \$ 661,966 | \$ 197,534 | \$ 607,930 | \$ 3,072,262 | \$ 487,919 | \$ 593,087 | \$ 4,153,268 |

See Notes to Financial Statements

Statement of Functional Expenses

For the Year Ended December 31, 2008

| | Biomechanics Research | Basic Science | Bioskills and Education | Clinical Research | Information Services | Imaging Research | Total | Management and General | Fundraising | Total |
|---|-----------------------|-------------------|-------------------------|-------------------|----------------------|-------------------|---------------------|------------------------|-------------------|---------------------|
| Salaries and benefits | \$ 537,381 | \$ - | \$ 128,722 | \$ 505,201 | \$ 123,590 | \$ 104,464 | \$ 1,399,358 | \$ 288,344 | \$ 179,726 | \$ 1,867,428 |
| Consulting and contract labor | 12,333 | 85,333 | - | 12,333 | 172 | 40,919 | 151,090 | 1,137 | 79,128 | 231,355 |
| Supplies (office, computer, lab) | 14,814 | 691 | 45,670 | 8,329 | 9,058 | 7 | 78,569 | 4,617 | 5,930 | 89,116 |
| Events and fundraising | - | - | - | - | - | - | - | - | 171,281 | 171,281 |
| Printing | 1,764 | 362 | 1,602 | 11,817 | 294 | - | 15,839 | 834 | 89,977 | 106,650 |
| Maintenance and supplies | 18,917 | - | 2,714 | 2,591 | 34,281 | 150 | 58,653 | 4,296 | 5,856 | 68,805 |
| Rent and leases | 15,515 | 568 | 16,886 | 10,297 | 9,841 | 1,798 | 54,905 | 2,338 | 3,302 | 60,545 |
| Telephone and utilities | 20,720 | - | 13,636 | 12,851 | 7,713 | 3,858 | 58,778 | 8,308 | 4,705 | 71,791 |
| Travel | 9,263 | 4,022 | 556 | 11,165 | 200 | 7,044 | 32,250 | 976 | 10,992 | 44,218 |
| Legal and accounting | 41,449 | - | 1,165 | 15,143 | 3,596 | 1,917 | 63,270 | 9,120 | 4,773 | 77,163 |
| Fellows | - | - | 23,254 | - | - | - | 23,254 | - | - | 23,254 |
| Education meetings/lectures | - | - | 51,699 | - | - | - | 51,699 | - | - | 51,699 |
| Direct mail/planned giving | - | - | - | - | - | - | - | - | 60,904 | 60,904 |
| Meals and entertainment | 4,248 | 908 | 28,010 | 2,834 | 369 | 2,261 | 38,630 | 13,763 | 24,143 | 76,536 |
| Gifts | 628 | 1,817 | 78 | 705 | 157 | 78 | 3,463 | 7,572 | 559 | 11,594 |
| Postage | 4,849 | 380 | 9,391 | 4,733 | 1,477 | 22 | 20,852 | 2,656 | 8,445 | 31,953 |
| Insurance | 1,265 | - | 82 | 1,306 | - | - | 2,653 | 53,850 | 313 | 56,816 |
| Meeting fees/registrations and dues and subscriptions | 3,863 | - | 8,487 | 704 | 128 | - | 13,182 | 388 | 2,437 | 16,007 |
| Bank/credit card fees | - | - | - | - | - | - | - | 14,117 | - | 14,117 |
| Meetings (Board and SAC) | - | 859 | 233 | - | - | - | 1,092 | 1,023 | - | 2,115 |
| Grant writing/medical editing | - | - | - | - | - | - | - | - | 6,433 | 6,433 |
| Research grant | - | 110,000 | - | - | - | - | 110,000 | - | - | 110,000 |
| Advertising | 4,000 | - | 90 | - | - | - | 4,090 | 177 | 177 | 4,444 |
| | 691,009 | 204,940 | 332,275 | 600,009 | 190,876 | 162,518 | 2,181,627 | 413,516 | 659,081 | 3,254,224 |
| Depreciation and amortization | 105,263 | - | 40,316 | 11,684 | 19,709 | 11,937 | 188,909 | 6,699 | 1,897 | 197,505 |
| Total | \$ 796,272 | \$ 204,940 | \$ 372,591 | \$ 611,693 | \$ 210,585 | \$ 174,455 | \$ 2,370,536 | \$ 420,215 | \$ 660,978 | \$ 3,451,729 |

See Notes to Financial Statements

Notes to Financial Statements

NOTE 1 - ORGANIZATION AND SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Organization

The Steadman Philippon Research Institute (the "Institute"), 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"). The Institute is located in Vail, Colorado, and is dedicated to keeping people of all ages physically active through orthopedic sports medicine research and education in the areas of arthritis, healing, rehabilitation and injury. The Institute's primary sources of support are public donations, grants, special events and corporate partners. Prior to January 1, 2010, the Institute was known as the Steadman Hawkins Research Foundation.

The Institute has agreements with several corporations who sponsor the Institute's research. This research is for the general use of and publication by the Institute. These agreements are recorded as income in the year payment is due.

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 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, 2009 and 2008, 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. At December 31, 2009, the Institute had cash in excess of federally insured limits totaling \$1,285,440.

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 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 statements of activities as unrestricted, temporarily restricted, or permanently restricted based upon the existence and nature of any donor or legally imposed restrictions.

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 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. 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.

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 forty 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.

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.

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

The Institute is exempt from federal income taxes under Section 501(c)(3) of the IRC. The Institute is not a private Institute within the meaning of Section 509(a) of the Code.

The Institute adopted guidance related to uncertainty in income taxes in Financial Accounting Standards Board's *Accounting Standards Codification* on January 1, 2009. After evaluating the tax positions taken, none are considered to be uncertain; therefore, no amounts have been recognized as of December 31, 2009.

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, 2009.

Tax years that remain subject to examination include 2006 through 2009.

Use of Estimates

The preparation of 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 and disclosure of contingent assets and liabilities at the date of the 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.

Reclassifications

Certain amounts in the 2008 financial statements have been reclassified to conform to the 2009 presentation.

NOTE 2 - INVESTMENTS

Long-term investments consist of the following:

| | December 31, | |
|------------------------|---------------------|---------------------|
| | 2009 | 2008 |
| Money markets | \$ 1,046,409 | \$ 589,543 |
| Stock and equity funds | 559,999 | 1,070,991 |
| Limited partnerships | 2,685,602 | 1,543,919 |
| | \$ 4,292,010 | \$ 3,204,453 |

Investment return consists of the following:

| | December 31, | |
|--|-------------------|----------------------|
| | 2009 | 2008 |
| Dividends and interest - reinvested | \$ 11,603 | \$ 51,936 |
| Net realized and unrealized gains (losses) | 743,500 | (1,086,045) |
| Total return on investments | \$ 755,103 | \$(1,034,109) |

NOTE 3 - CONTRIBUTIONS

Contributions receivable consist of the following:

| | December 31, | |
|---------------------------|-------------------|-------------------|
| | 2009 | 2008 |
| Due in less than one year | \$ 131,400 | \$ 106,400 |
| Due in one to five years | 126,400 | 232,800 |
| | 257,800 | 339,200 |
| Less unamortized discount | (11,374) | (23,448) |
| | \$ 246,426 | \$ 315,752 |

The discount rate used was 5% for both 2009 and 2008.

NOTE 4 - PROPERTY AND EQUIPMENT

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

| | December 31, | |
|--|---------------------|---------------------|
| | 2009 | 2008 |
| Equipment | \$ 233,363 | \$ 233,363 |
| Furniture and fixtures | 97,477 | 97,477 |
| Leasehold improvements | 851,742 | 38,361 |
| Machines and video equipment | 1,061,520 | 1,061,520 |
| Medical equipment | 1,974,704 | 1,974,704 |
| | 4,218,806 | 3,405,425 |
| Less accumulated depreciation and amortization | (1,627,267) | (1,025,297) |
| | \$ 2,591,539 | \$ 2,380,128 |

NOTE 5 - LINE-OF-CREDIT

The Institute has a \$250,000 line-of-credit with a bank, which bears interest at the prime rate per annum (3.25% at December 31, 2009) and matures August 2010. The outstanding balance was \$15,146 and \$32,036 at December 31, 2009 and 2008, respectively.

NOTE 6 - LONG-TERM DEBT

Long-term debt consists of the following:

| | December 31, | |
|--|--------------|------|
| | 2009 | 2008 |
| Note payable to a bank, interest accruing at 4.75%, payable in monthly installments of principal and interest of \$958, due August 2012. | \$ 28,697 | \$ - |
| Less current portion | (10,339) | - |
| Long-term portion of debt | \$ 18,358 | \$ - |

Maturities of the note payable are as follows:

| For the Year Ending December 31, | |
|----------------------------------|-----------|
| 2010 | \$ 10,339 |
| 2011 | 10,842 |
| 2012 | 7,516 |
| | \$ 28,697 |

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, | |
|-------------------------------|--------------|--------------|
| | 2009 | 2008 |
| Equipment | \$ 2,188,507 | \$ 2,188,507 |
| Less accumulated amortization | (545,975) | (201,157) |
| | \$ 1,642,532 | \$ 1,987,350 |

Maturities of capital lease obligations are as follows:

| For the Year Ending December 31, | |
|---|-------------|
| 2010 | \$482,470 |
| 2011 | 482,470 |
| 2012 | 539,327 |
| 2013 | 387,536 |
| 2014 | 101,388 |
| Total minimum lease payments | 1,993,191 |
| Amount representing interest | (153,655) |
| Present value of net minimum lease payments | 1,839,536 |
| Less current portion | (417,007) |
| Long-term capital lease obligation | \$1,422,529 |

NOTE 8 - RETIREMENT PLAN

The Institute has a defined contribution retirement plan (the "Plan") under Internal Revenue Code ("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 \$14,856 and \$17,278 to the Plan in fiscal year 2009 and 2008, respectively.

NOTE 9 - TEMPORARILY RESTRICTED NET ASSETS

The temporarily restricted net assets represent the net proceeds of donations which have been restricted by the donors to be used only for the following purposes:

| | December 31, | |
|------------------------------------|--------------|--------------|
| | 2009 | 2008 |
| Assets available for | | |
| Education | \$ 590,694 | \$ 542,127 |
| Imaging research | - | 325,545 |
| Assets available in future periods | | |
| Contributions receivable | 257,800 | 339,200 |
| | \$ 848,494 | \$ 1,206,872 |

NOTE 10 - RELATED PARTY TRANSACTIONS

During 2009 and 2008, the Institute received approximately \$381,000 and \$450,000, respectively, in contributions from related parties including various Board members, as well as the Steadman Clinic (the "Clinic").

In addition, the Institute received \$1,132,990 and \$48,750 from the Clinic during 2009 and 2008, respectively, for the use of certain equipment.

NOTE 11 - FAIR VALUE MEASUREMENTS

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.



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