



STEADMAN PHILIPPON RESEARCH INSTITUTE

2014-2015 Annual Report

SPRI



AN INTERNATIONAL CENTER FOR RESEARCH AND EDUCATION — KEEPING PEOPLE ACTIVESM

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

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

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

OUR PRIMARY AREAS OF RESEARCH AND EDUCATION ARE:

DEPARTMENT OF BIOMEDICAL ENGINEERING – advances patient care by focusing on injury mechanisms and prevention, develops and validates novel surgical treatments and rehabilitation techniques, and teaches advanced research protocols using state-of-the-art biomedical research techniques and technologies.

CENTER FOR OUTCOMES-BASED ORTHOPAEDIC RESEARCH – conducts evidence- or outcomes-based research using actual clinical data that aids both physicians and patients in making better and more informed treatment decisions.

CENTER FOR REGENERATIVE SPORTS MEDICINE – focuses on the basic science of regenerative medicine and the translation of this research into practical orthopaedic treatments.

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.

SURGICAL SKILLS LABORATORY – implements new surgical technologies and trains surgeons in new techniques using state-of-the-art equipment.

EDUCATION AND FELLOWSHIP PROGRAM – administers and coordinates the physicians-in-residence fellowships and visiting scholars programs, hosts conferences and international medical meetings, produces and distributes publications and educational media, and organizes educational outreach programs in partnership with the local school district.

MISSION

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

HISTORY

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

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

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

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

Athletes are becoming bigger, faster, and stronger. Unfortunately, their connective tissue does not. Therefore, injuries are becoming more complex. Our research into the anatomy and mechanisms of the complex knee, hip, and shoulder is being recognized worldwide.

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

Philanthropic gifts are used to advance scientific research and to support scholarly academic programs that train physicians for the future. Through our fellowship and visiting scholar programs, the Institute has now built a network of more than 200 fellows and visiting scholars worldwide who share the advanced ideas and communicate the concepts they learned in Vail to their patient base.

BOARD OF DIRECTORS & OFFICERS

BOARD OF DIRECTORS AND OFFICERS:

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Founder and Co-Chairman
Steadman Philippon Research Institute
Vail, Colo.

Marc J. Philippon, M.D.
Co-Chairman
Steadman Philippon Research Institute
Vail, Colo.

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Philippon Research Institute
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Chief Executive Officer (retired)
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Norm Waite
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H.M. King Juan Carlos I of Spain

IN MEMORIAM:

J. Michael Egan
President and Chief Executive Officer
Steadman Philippon Research Institute
Vail, Colo.

The Honorable Jack Kemp
Chairman and Founder
Kemp Partners
Washington, D.C.

THE YEAR IN REVIEW

DEAR FRIENDS, WE ARE EMBARKING ON THE MOST SIGNIFICANT AND EXCITING EXPANSION OF THE INSTITUTE'S RESEARCH PROGRAMS IN ITS 27-YEAR HISTORY.

Philanthropy from grateful patients and others who have benefitted from our work has been the driving force for these and other advances since SPRI's founding. SPRI's regenerative medicine and biomedical engineering research on the knees, hips, spines, shoulders, and ankles—and the therapies they have yielded—are now recognized worldwide.

As we look to the future, it is logical to expand the pioneering work that has been conducted here for nearly three decades. In order to accelerate the delivery of new treatments, our scientists will broaden our tradition of developing ground-breaking therapies in joint preservation.

An aging population highlights the need for advancing ways to treat musculoskeletal diseases, injuries, and congenital conditions. Many conventional medical treatments address only the symptoms. Regenerative medicine is uniquely capable of attacking the root cause of the disease by helping the body use its own mechanisms to heal itself.

The newly formed Steadman Philippon Research Institute Center for Regenerative Sports Medicine will focus solely on regenerative sports medicine. SPRI already has the components of Translational and Regenerative Medicine Research, BioMedical Engineering, Outcomes-Based Research, Imaging Research, Education, and a world-renowned Orthopaedic Fellowship Program. The Center will include a new facility to house these departments, as well as surgical skills and biomechanical labs.

On May 1, the Steadman Philippon Research Institute welcomed Dr. Johnny Huard as chief scientific officer and director of the new Center (page 38). Formerly with the University of Pittsburgh

Medical Center, Dr. Huard is internationally recognized in stem cell research and regenerative medicine as it relates to the musculoskeletal system and other specialties.

Expansion of SPRI's research programs will provide patients the opportunity to benefit from new, evidence-based orthopaedic cellular therapeutic treatments. We want to share SPRI's discoveries and their clinical applications with other medical providers in the U.S. and around the world.

In order to fund the expansion of our research programs, SPRI will be launching an international capital and endowment fundraising campaign among our patients and other philanthropists who have a strong interest in regenerative and translational medicine. As a loyal supporter and friend, we hope that you will want to take part in making this essential expansion a reality.

We look forward to providing you with updates and especially to explaining in greater detail how this new research will help all of us stay active, stronger, and healthier, while reducing health care costs.

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

Respectfully yours,



J. RICHARD STEADMAN, M.D., CO-CHAIRMAN



MARC J. PHILIPPON, M.D., CO-CHAIRMAN



DAN DRAWBAUGH, PRESIDENT AND
CHIEF EXECUTIVE OFFICER



PHILANTHROPY

PHILANTHROPY

GENERAL PETE DAWKINS: A LIFETIME OF SERVICE TO COUNTRY, ACHIEVEMENT IN BUSINESS, AND COMMITMENT TO STRENGTH TRAINING AND SPORTS

By Jim Brown, Ph.D., Executive Editor, SPRI News

At age 11, the prospect of Peter Miller Dawkins later becoming a three-sport high school star, an All American halfback at Army, and a Heisman Trophy winner did not look promising. His growth already slowed by scarlet fever, now he had polio.

"Polio was a major debilitating disease in the era when I got it," says retired U.S. Army Brigadier General Pete Dawkins. "The standard treatment was to put you in a body cast. Unfortunately, doing so usually resulted in permanent deformation of the spine."

His mother, Frances, had other ideas. She found a young doctor in Detroit named Ethel Calhoun, who pioneered the Sister Kenny method of using hot packs, therapy, and aggressive exercise to treat people, especially children, stricken with polio.

"I owe my mother and Dr. Calhoun a huge debt of gratitude," says General Dawkins. "I went through two years of daily physiotherapy, which was very aggressive, to the extent that it would often make me cry as they manipulated these different muscle groups."

Dr. Calhoun's methods worked, and Pete Dawkins' athletic career was about to take off. "If you could kick it, hit it with a stick, or throw it, I would play it, but I was still very small for my age and knew I was going to have to build up my physical stature," he remembers.

CHARLES ATLAS ADS

"The real starter for me was a Charles Atlas advertisement in the back of *Popular Mechanics* magazine. Atlas had come up with something he called Dynamic Tension, which was actually isometric exercise before anybody knew what it was. I sent my money, got the manual, and did the exercises."

"I also wanted to start weight-lifting, but I didn't have any weights, so I took a lead pipe, two big coffee can-sized containers, filled them with cement, and made a set of barbells. With that primitive equipment, I set out with a kind of maniacal determination to transform myself from the proverbial '98-pound weakling' into a Charles Atlas. My enthusiasm was unmistakable and, before long, my parents bought me a set of weights."

"When I got to high school (Cranbrook School), I was the smallest player on the freshman football team and was cut from the basketball team. But day-after-day, for four years, I continued my regimen and by the time I graduated, I was 6-1, and weighed 185 pounds."

At Cranbrook, he was captain of the baseball team and an All-League split-T running quarterback in football.

ACCEPTANCE INTO WEST POINT

Pete had been offered a full, four-year scholarship at Yale, but a trip to West Point with his high school coach, meeting the legendary Army Head Coach Earl "Red" Blaik, and seeing the United States Military Academy solidified where he wanted to go to college.

By the time he decided, however, it was too late to apply. He took the entrance and physical exams anyway, and was placed into the Qualified Alternate pool. When another applicant decided not to attend West Point, Dawkins was selected for admission by Jack Riley, Army's hockey coach—not Colonel Blaik, the football coach.

"I got a telegram on June 26th notifying me that I had been selected for the Class of 1959 and that I was to report to the Military Academy on July 3rd. I walked into the kitchen and told my parents that I was going to West Point."

NO WEIGHTLIFTING ALLOWED

"I realized I was never going to be able to compete at the Division I level of college football at 185 pounds, but Army did not allow its athletes to lift weights."

"They didn't want you to be muscle-bound," he says. "I coaxed my parents to drive from Michigan with a set of barbells in the trunk of their car. We managed a secretive handoff of the weights through the window of my room in the barracks."

There was another problem, but Pete's commitment to weightlifting prevailed again. Rooms were inspected every day and



Brigadier General Pete Dawkins and Judi Dawkins

because weights were prohibited, he had to figure out a way to hide them.

“I strapped the bar to the backside of the metal bunk with two belts and laid the weights flat between the spring and the mattress. After taps every night, I lifted weights in the dark. I did that for four years and played my senior year weighing almost 220 pounds.”

HONORS—ACADEMIC AND ATHLETIC

If you know anything about college football history, you know about Pete Dawkins’ career at Army. Captain of an undefeated team, All-American, Heisman Trophy winner, cover of *Life Magazine*. To this day, he is the only Cadet to ever serve as Brigade Commander, president of his class, captain of the football team, and a “Star Man”—in the top five percent academically. His class at West Point produced six Rhodes Scholars, and he was one of them. He later attended Princeton, where he earned an M.P.A. and a Ph.D.—two of his five degrees

24 YEARS A SOLDIER

General Dawkins served in Vietnam and Korea. He rose to the rank of Brigadier General with commands in the 82nd and 101st Airborne Divisions, earning two Bronze Stars for valor and three Vietnamese Crosses of Gallantry. He taught at West Point, worked on the task force to adapt the Army to a volunteer status, and was selected as a White House Fellow. At the Pentagon, he finished his military career as the Army’s Director of Strategy, Plans, and Policy.

After his service in the Army, General Dawkins became a partner in the Wall Street firm of Lehman Brothers as head of Public Finance Banking. He later joined Bain and Company, was CEO of Primerica Financial Services, and ultimately rose to become Vice Chairman of Citigroup’s Global Wealth Management.

He was elected to the National Football Foundation and College Hall of Fame in 1975, received the Eisenhower Award for distinguished service in 2000, and was honored with the Horatio Alger Award in 2006.

MORE MEDICAL CHALLENGES

It may not be a record, but General Dawkins has had more than his fair share of orthopaedic issues—19 surgeries, six platelet-rich plasma procedures, and a dozen epidural injections. Seventeen of those procedures were done by Steadman Clinic doctors, as well as another procedure involving his wife Judi, one more for his son, Sean, and three for daughter, Noel. The “Family Dawkins” have been the beneficiaries of 22 major Steadman Clinic surgical procedures

“I’ve had the good fortune of a lifetime of involvement in sports,” says Dawkins. “And I’m still able today to work out, lift weights, and enjoy a fully active lifestyle. That was only made possible by the talent and commitment of the spectacular Steadman Philippon team.”

“Judi and I began coming to Vail in the 1970s, before the Steadmans moved here. Soon after they arrived, however, we were introduced and, before long, we became good friends.”

"The first surgery D. Steadman did on me was an injured knee that had been repaired, but kept getting worse. He decided that microfracture was called for, but it turned out that I needed shoulder surgery, as well. It's a long and somewhat complicated story, but I ended up badgering Dr. Steadman and Dr. Hawkins into doing the two surgeries simultaneously—with a single anesthesiologist. We laugh about it to this day, but in retrospect, it's clear that my stubborn insistence really wasn't all that wise a decision."

THE STEADMAN PHILIPPON APPROACH

"To me, there are a number of examples of genius that Dr. Steadman, Dr. Philippon, and their colleagues have brought to The Steadman Clinic and the Steadman Philippon Research Institute. The classical model of orthopaedic surgery is for the surgeon to perform the operating room procedure, then turn the patient over to physical therapists and, likely, never see them again."

"The philosophy here is entirely different. The surgeons are in physical therapy rooms every day, monitoring their patients' progress, offering ideas, and making suggestions about adjustments and refinements. This close teamwork among doctors, therapists, and patients is a lasting legacy of Dr. Steadman's approach and is at the heart of what makes this place so creative and so special."

General Dawkins also notes that The Steadman Clinic doctors are involved citizens in the Vail Valley community, not just physicians. He became familiar with the Steadman Philippon Research Institute "by osmosis," serving on a medical board with Dr. Steadman, learning about the kinds of sophisticated research being conducted, and following the expanding nature of SPRI's influence on the orthopaedic sports medicine world

NEW FRONTIERS

"They are taking their unique approach to treatment, rehabilitation, and the intimate interconnection between the two, to the next level through the Research Institute. Now they are addressing new frontiers of regenerative sport medicine not in a casual way, but through strict, disciplined, and professional approaches. It's very exciting."

Gen. Dawkins is particularly aware that many physicians look at people in his age group and think there is no reason to undertake exceptional measures to restore full athletic ability after serious injuries to the hip, knee, or other joints. They seem willing to accept major limitations and to take the approach that the body will just take care of itself.

"But if somebody like me wants to continue skiing, playing golf, and living a full and active life, it's not okay," says Dawkins. "The mindset of people at Steadman Philippon is to help people, regardless of their age, return to full athletic competency. That mindset is a treasure."

UNLIKE ANYTHING IN THE MEDICAL WORLD

"Supporting the work of SPRI is supporting these doctors and scientists who are trailblazers, pursuing initiatives unlike anything else I'm aware of in the medical world. If those who read this report are making decisions about non-profit institutions to support, I hope SPR is right at the top of the list."

It's apparent that General Pete Dawkins is not finished attacking the kinds of challenges he's faced ever since he won his fight against polio as a kid.



Dr. Johnny Huard: A Look Into the Future of Regenerative Sports Medicine

By Jim Brown

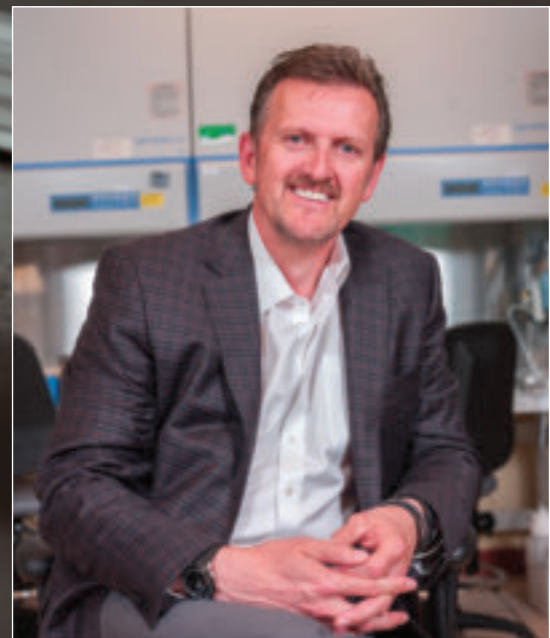
Imagine what orthopaedic sports medicine could be 25 years from now.

What if a person's own stem cells or platelet-rich plasma could be injected or combined with exercise to help patients delay or avoid joint replacement—or heal faster—or enable muscles to heal stronger—or minimize scarring following surgery?

You won't have to wait 25 years. The future of regenerative sports medicine is now. These advances are already in development, and the person who is leading SPRI's new Center for Regenerative Sports Medicine is Johnny Huard, Ph.D., chief scientific officer.

Dr. Huard joined SPRI on May 1, 2015. Originally from Quebec, Canada, he is the former vice chair for Musculoskeletal Cellular Therapeutics at the University of Pittsburgh. He was also director of the Stem Cell Research Center and the Henry J. Mankin Professor in the Department of Orthopaedic Surgery.

He is a world-renowned expert in the field of stem cell research who has extensive expertise in gene therapy, tissue engineering, and regenerative medicine—all based on the use of muscle-derived adult stem cells.



Dr. Huard's appointment at SPRI is part of a unique partnership between the Research Institute and the University of Texas Health Sciences Center in Houston.

DR. STEADMAN WAS THE PIONEER

Dr. Huard quickly acknowledges that SPRI's Dr. Richard Steadman was a pioneer in this field, although it wasn't called regenerative sports medicine at the time. "Dr. Steadman was well ahead of his time. He wanted his patients to be active immediately after surgery. He began to document how this approach was helpful, but no one knew then the science behind why it was working."

Can stem cells be the ultimate body repair kit?

"Twenty-five years later, our research has shown that stem cells come from blood vessels, and that if you increase the number of blood vessels through exercise, you can increase the number of stem cells."

"At SPRI, we will test our premise that transplanting a person's own stem cells won't make that person younger, but that it will delay aging-related disease and conditions such as osteoarthritis and osteoporosis. In the process, we are learning how to make healing and recovery better."

THE SPRI CONNECTION

"I became interested in The Steadman Clinic a long time ago because of Dr. Steadman's reputation and in SPRI because of its excellence in research. The Institute was already doing work with platelet-rich plasma (PRP; blood plasma enriched with growth factor platelets) and cell biology."

"The physicians who were joining the staff at SPRI were the premier orthopaedic surgeons in the world, and they were putting themselves on the edge because the things they were doing were new."

"Also, I knew Dr. Philippon when he was at the University of Pittsburgh and that he was continuing Dr. Steadman's legacy by making tremendous advances in the field of hip surgery."

RAPID BENCH-TO-BEDSIDE CAPABILITY

Dr. Huard adds that an important factor in his decision to join the staff at SPRI was its capacity to rapidly take an innovative technique or therapy from the research bench to the patient's bedside.

"The best example I can give you is that we are in clinical trials right now with an anti-fibrosis (anti-scarring) agent called losartan. Dr. Philippon was preparing to do surgery on one of his patients. I suggested that (with the patient's approval) he put the patient on losartan after the surgery. He did and the patient responded well to the therapy. That kind of bench-to-bedside speed might not have been possible at a larger institution."

FOUR INVESTIGATIONS

Dr. Huard's initial research at SPRI will focus on four investigations. The first is to evaluate the effects of exercise and neuromuscular stimulation/massage on tissue repair after an injury.

The second looks at delaying joint degeneration through the injection of adult stem cells and other biologics (medical products made from a biological source). His team wants to find the answer to the question, "Can stem cells be the ultimate body repair kit?"

The third study will be a collaboration between Dr. Huard, Dr. Philippon, and Dr. Robert LaPrade, who have injected PRP into selected hip and knee patients to help them heal faster. The three



researchers believe that combining PRP with the patient's own stem cells in an affected joint will significantly accelerate the healing process.

The fourth initiative will measure the effects of anti-fibrotic agents on tissue repair. Significantly reducing scarring in the injured tissue could create a dramatically more satisfying and faster recovery.

VAIL SCIENTIFIC SUMMIT

On the weekend of August 21-22, Dr. Philippon, Dr. Huard, and SPRI joined with others to host the inaugural Vail Scientific Summit, subtitled Regenerative & Translational Medicine: A Collaborative Vision.

The symposium, which attracted some of the nation's top scientists and physicians, focused on the latest regenerative medicine updates and the international impact to the scientific community and patient care.

TIMETABLES, GOALS

"It is very difficult to predict exact timetables in terms of research outcomes," says Dr. Huard, "but we may be within a year for some of the PRP applications. With stem cells, we have already seen positive results with 12 patients to repair cardiac tissue and 500 patients to reduce bladder dysfunctions. Because of advances we've made in other areas, we may be able to go faster in sports medicine."

Dr. Huard's timetable for the new Regenerative Sports Medicine Laboratory at SPRI is much more specific.

"By the end of the first year, we want the lab to be well funded, to be fully functional, and to have produced multiple publications to show people what we are doing."

He is also explicit in his expectations of where he wants the SPRI Center for Regenerative Sports Medicine to be in terms of world leadership. "We want people around the world to know about viable treatment options for orthopaedic injuries and conditions. Based on our interaction with other departments at SPRI, we will be able to tell patients what works, what doesn't work, and explain the reasons why. The Center will be a place where we make treatments better and safer for our patients."

In the long term, Dr. Huard envisions every person having the opportunity to harvest his or her own stem cells, preferably at a young age. The cells could be frozen, stored, and then re-injected later to help those people age better, enjoy an active life, and get the best treatment when they need it. Although it may take 10 years to perfect, the procedure could literally slow down the aging process.

Dr. Huard brings an unparalleled record of achievements, publications, and awards to the Steadman Philippon Research Institute. With your support, there is every reason to believe that he, his team, and his colleagues at SPRI represent the future of regenerative sports medicine to the rest of the world.



VAIL SCIENTIFIC SUMMIT FEATURED TOP RESEARCHERS, PHYSICIANS IN REGENERATIVE AND TRANSLATIONAL MEDICINE

The Steadman Philippon Research Institute and the Vail Valley Medical Center hosted the first-ever Vail Scientific Summit on Friday and Saturday, August 21-22, at the Four Seasons Resort and Residences.

A select group of internationally known physicians and scientists collaborated for the symposium, sub-titled Regenerative & Translational Medicine: A Collaborative Vision. A series of presentations focused on the latest regenerative medicine advances and how they can be translated to patient care. Universities and medical institutions from throughout the United States were represented.

UNDERSTANDING REGENERATIVE MEDICINE

Regenerative medicine is a branch of research in tissue engineering and molecular biology that focuses on using the body's own healing capabilities. This specialized discipline may soon offer a way to replace, engineer, or regenerate human cells, tissues, or organs to restore or establish normal function.

"Regenerative medicine is the future of medicine," says Dr. Marc Philippon, Managing Partner at The Steadman Clinic and Co-Chair of SPRI. "As surgeons, we perform and repair with every procedure, but we need to take the next step to figure out a safe and productive way of adding biologics to a procedure that will help the healing process, recovery, and keeping all of us active."

KEYNOTE SPEAKER

The Keynote Speaker at the Summit was Freddie Fu, M.D., Distinguished Service Professor at the University of Pittsburgh Medical School and Chairman of the Department of Orthopaedic Surgery. Dr. Fu has been honored with more than 250 professional awards and honors, made over 1100 national and international presentations, co-authored 173 books chapters, is an author of over 550 peer-reviewed articles, and has edited 30 major orthopaedic textbooks.

In addition to Dr. Fu, Johnny Huard, Ph.D., Chief Scientific Officer and Director of SPRI's Center for Regenerative Sports Medicine, chaired a session on stem cells, gene therapy, and tissue engineering.

According to Dr. Huard, "While regenerative medicine is not a 'fountain of youth,' it has the hope, potential, and intention of helping people age in a healthy and more comfortable manner as they inevitably encounter injuries and diseases throughout life."

OTHER SPEAKERS, PRESENTATIONS

Other speakers at Dr. Huard's session included Dr. Christopher Evans of Mayo Clinic, Dr. Paul Robbins of the Scripps Research Institute, and Dr. Laurie Goodrich of Colorado State University.

Dr. Philippon led presentations on ligament, tendon, and meniscus that included guest speakers from the University of Pittsburgh and the University of Rochester.

SPRI's Dr. William Rodkey and Colorado State's Dr. Wayne McIlwraith chaired a session on platelet rich plasma. Guest speakers came from Colorado State and Cornell University, and included Dr. David Karli and Dr. Thomas Evans of The Steadman Clinic.

Dr. Huard concluded the Scientific Program with updates on the status of regenerative medicine clinical trials.

LANDMARK EVENT

"Vail Valley Medical Center was honored to join the Steadman Philippon Research Institute as hosts for this significant event," said Doris Kirchner, President/CEO of VVMC. "Mike Shannon (Chairman, Vail Health Services Board) and Dr. Johnny Huard invited some of their most talented and respected colleagues to join us, and I commend them for their efforts in confirming Vail as a center of orthopaedic excellence."

"Mike Shannon deserves a tremendous amount of credit for his leadership and support in making this event possible," said Dr. Huard. "We brought together the best of the best in the field of research in regenerative and translational medicine. Their collaboration, which is based on patient-focused ideals and principles, addressed the endless possibilities that stem cell research and regenerative medicine have for all of us."

"This event brought some of the premiere visionaries and experts in the field of regenerative and translational medicine to Vail," said Dan Drawbaugh, CEO of SPRI and The Steadman Clinic.

"The Steadman Philippon Research Institute is proud to have collaborated with the Vail Valley Medical Center on this very special symposium. This was a landmark event and featured the very best researchers, doctors, and scientists the field has to offer."



Vail Scientific Summit attracted more than 120 participants



AWARDS & RECOGNITION

AWARDS & RECOGNITION

DR. RICHARD STEADMAN INDUCTED INTO THE AMERICAN ORTHOPAEDIC SOCIETY FOR SPORTS MEDICINE HALL OF FAME

J. Richard Steadman, M.D., was inducted into the American Orthopaedic Society for Sports Medicine's (AOSSM) Hall of Fame on Friday, July 10, during the Society's Annual Meeting in Orlando, Florida. AOSSM Hall of Famers are individuals in the sports medicine community who have contributed immensely and set themselves apart from others in the field.

Dr. J. Richard Steadman was born in Sherman, Texas. He received his undergraduate degree from Texas A&M University, where he played football under Coach Paul "Bear" Bryant. He received his medical degree from the University of Texas Southwestern Medical School in Dallas, Texas. Following internship at Charity Hospital in New Orleans, Dr. Steadman served two years in the U.S. Army in Germany, then returned to Charity Hospital where he completed his orthopaedic residency in 1970.

Dr. Steadman began his sports medicine orthopaedics career in South Lake Tahoe, California, in 1970. He became active with the U.S. Ski Team soon thereafter, and he donated his services at what became the first ever U.S. Olympic Training Center in Squaw Valley, California.

He was the Head U.S. Alpine Ski Team Physician from 1976 to 2012 and developed the U.S. Ski Team Sports Medicine Committee. He continues today as the chairman of the medical group of the U.S. Ski Team. He has been inducted into the United States and the Colorado ski halls of fame. He was also awarded the AT&T Skiing Award, which is given to someone whose excellence and dedication to skiing has profoundly enriched the sport.

An award-winning innovator and mentor in the field of orthopaedic sports medicine, Dr. Steadman founded the non-profit Steadman Sports Medicine Research Foundation in 1988 at South Lake Tahoe, California. Its purpose was to collect and analyze patient data and outcomes over time. That organization exists today as Steadman Philippon Research Institute, which is known worldwide for its unprecedented clinical database and research into orthopaedic injuries of the knee, hip, shoulder, ankle, and spine.



Early in his career at South Lake Tahoe, Dr. Steadman developed significant improvements in the field of post-surgical rehabilitation. These techniques are important in shortening and strengthening the healing process after surgery.

Steadman is internationally known for the development of many advanced surgical procedures for the knee, including "microfracture," a procedure that repairs the damaged joint, and encourages the re-growth of articular cartilage. Today, microfracture is the most common treatment for chondral defects of the knee. He also developed the "healing response," and most recently (in 2011), "The Package," a technique that can restore normal, comfortable movement to the stiff and painful arthritic knee, thereby avoiding joint replacement surgery.

Dr. Steadman was a proponent of early motion and physiologic loadbearing after ACL reconstruction. He has had more than 225 articles published and has made nearly 700 presentations.

In 1990, he moved his practice to Vail, Colorado, and became the founding and managing partner of The Steadman Clinic. Prior to his retirement from clinical practice in 2014, Dr. Steadman served as a consultant to several professional sport teams in the U.S. and Europe.

AOSSM is a world leader in sports medicine education, research, communication and fellowship, and includes national and international orthopaedic sports medicine leaders. The Society works closely with many other sports medicine specialists, including athletic trainers, physical therapists, family physicians, and others to improve the identification, prevention, treatment, and rehabilitation of sports injuries. AOSSM is also a founding partner of the STOP Sports Injuries campaign to prevent overuse and traumatic injuries in kids.



STEADMAN HONORED WITH NATIONAL SPORTS PHYSICIAN AWARD

Dr. Richard Steadman has been recognized for his contributions to sports medicine by the American Physical Therapy Association (APTA). Dr. Steadman received the Jack C. Hughston Sports Physician Award from the APTA's Sports Physical Therapy Section at a February 6th meeting in Indianapolis. Dr. Hughston, who is widely recognized as one of the fathers of sports medicine, died in 2004.

"Dr. Steadman's selection for this prestigious award was based on his many contributions to the sports physical therapy community," said Dr. Barbara Sanders, chair of the award committee of the APTA's Sports Physical Therapy Section.

APTA is an individual membership professional organization representing more than 85,000 member physical therapists, physical therapist assistants, and students.



DISTINGUISHED ALUMNUS

Congratulations to Dr. Richard Steadman

On April 30 in Vail, Colorado, Dr. Steadman was presented with the Texas A&M University Distinguished Alumnus Award for his groundbreaking contributions to orthopaedic sports medicine. Dr. Steadman received his undergraduate degree from Texas A&M in 1959. During his time as an Aggie, he played football for head coach Bear Bryant.

The Distinguished Alumnus Award is the highest honor bestowed upon a former student of Texas A&M University, awarded since 1962 to fewer than 250 of Texas A&M's 425,000 former students. Presented jointly by the university and The Association of Former Students, this award recognizes Aggies who have achieved excellence in their chosen professions and made meaningful contributions to Texas A&M University and their local communities.



MENISCUS REPAIR STUDY DIRECTED BY DR. ROBERT LAPRADE WINS INTERNATIONAL SPORTS MEDICINE RESEARCH AWARD

The International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine (ISAKOS) selected an SPRI research paper directed by Dr. Robert LaPrade as the 2015 ISAKOS Achilles Sports Medicine Research Award winner.

The study, titled “Biomechanical Consequences of a Nonanatomic Posterior Medial Meniscus Root Repair After a Root Tear,” was presented at the 10th Biennial ISAKOS Congress, June 8 in Lyon, France. Seven other SPRI researchers served as co-authors.*

“We are excited for this major achievement and the international recognition of SPRI’s excellent research,” said Travis Turnbull, Ph.D., deputy director and senior engineer/scientist, Department of BioMedical Engineering.

The root attachments of the posterior horns of the medial and lateral meniscus are very important for joint health. The posterior horns are those portions in the back part of the knee. When they are torn, loading of the joint is equivalent to having no meniscus on the affected side. These patients can often have early onset arthritis, the development of bony edema (swelling within the bone), insufficiency fractures (stress fractures), and the failure of concurrent cruciate ligament reconstruction grafts (grafts performed at the same time). For this reason, a great deal of research has gone into meniscus root repairs over the last several years.

The technique involves isolating the root, placing a minimum of two sutures in the remaining meniscal attachment, and trying to reposition it back to a more anatomic position. This research project promoted the awareness for the requirement of precision during a technically demanding meniscal surgery and showed that an improperly repaired meniscus did not significantly restore the function of the meniscus.

The prestigious Achilles Orthopaedic Sports Medicine Research Award was created to recognize researchers who have performed outstanding clinical or laboratory research in the field of sports medicine. This award is a reflection and validation of SPRI’s research toward the goal of keeping people of all ages physically active through orthopaedic research and education.

By publishing these findings in the number one-ranked orthopaedic journal (*The American Journal of Sports Medicine*) and presenting the research at an esteemed international conference, SPRI researchers have informed a broad audience of surgeons and positively affected patient outcomes around the world.

[* Co-authors — Chris LaPrade, B.A., Abdul Foad, M.D., Sean Smith, M.Sc., Travis Turnbull, Ph.D., Grant Dornan, M.Sc., Lars Engebretsen, M.D., Ph.D., and Coen Wijdicks, Ph.D.]

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DR. PETER MILLETT'S CAREER GUIDED BY FAMILY, FOCUS, AND INFLUENTIAL MENTORS

By Jim Brown

Perhaps it was preordained or a vocation—a calling. His high school's motto (in Latin, 'ad altoar natus') meant "born for higher things," a guiding ideal he took seriously and literally.

Whatever it was, Peter Millett's path to becoming one of the world's premier orthopaedic surgeons began early. It was driven by his ability to focus on a goal, by events—some difficult, and a legendary procession of teachers and mentors.

"As long as I can remember, I wanted to be a doctor," he says, recalling his childhood and growing up in the small rural town of Dalton, Pennsylvania. "I had a younger brother, Andy, who died of cancer when I was 14. The dedication of his doctors at Children's Hospital in Philadelphia really solidified my dream. His oncologist was D. Audrey Evans. She is a famous cancer researcher and clinician, and was the person who founded the Ronald McDonald Houses."

Dr. Millett grew up on a small farm and learned to use his hands early. Like many other orthopaedic surgeons, Dr. Millett played sports in high school (baseball and football). He skied competitively, still does, and liked everything outdoors. To this day, he enjoys pursuing his passion for fly fishing and serving on the Board of Directors of the American Museum of Fly Fishing.

"My parents had a profound impact on me," he says. "Their love and support were the most important influences on my life." He still talks with them several times a week.

A TRANSFORMATIVE PLACE

"I probably started thinking about orthopaedic surgery when I was in college at the University of Scranton, and then really became interested in the field in medical school at Dartmouth, which was a transformative place for me. I loved being there, and I met so many interesting and inspirational people," he says. "Dartmouth really did a great job of training doctors to be great clinicians with great bedside manners. They taught you about the importance of compassion and rapport and caring for the patient."

"In medical school I also had the opportunity to observe surgery, and liked the mechanical aspects of it. I developed a growing awareness that orthopaedic surgery improved people's lives qualitatively, not just quantitatively. The outcomes were fairly direct and tangible, the specialty allowed you to treat patients from pediatrics to geriatrics, and it demanded a broad range of surgical skills."

"While I was in med school, I saw a clipping in the Vail newspaper about Dr. Richard Steadman and his research foundation in Vail. I knew about him because of my ski racing background. I called and asked him if I could go there to do research. He said they didn't take medical students, just fellows. I really didn't know what a fellow was at that time, so I said, 'Okay, I'll come back and be a fellow one of these days.' Sure enough, I was able to become a fellow several years later."

RESEARCH AT CAMBRIDGE

While in med school, Dr. Millett was selected to serve as a Visiting Research Scholar at the University of Cambridge, England, the second oldest university in the English-speaking world. Cambridge has a tradition of great scientists, from Sir Issac Newton, to Charles Darwin, to James Watson and Francis Crick, who, in 1962, were awarded the Nobel Prize for the discovery of the structure of DNA, called one of the most significant discoveries of the 20th century.

"I conducted research in orthopaedic surgery, principally skeletal biology," he says. "Some of the scientists there were pioneers in transplant surgery. Learning to ask scientific questions and to find answers that could advance the field helped make my year at Cambridge a great experience." Dr. Millett was awarded a master's degree in science (M.Sc.) for his work at Cambridge.

DARTMOUTH, NEW YORK, AND VAIL

He returned to Dartmouth for his final year of medical school, then went to New York City's Hospital for Special Surgery, one of the oldest and most prestigious hospitals for residencies in the country. Again, he was exposed to great doctors and great surgeons. One who particularly inspired Dr. Millett was Dr. Russell Warren, a pioneer in sports medicine who at the time was surgeon-in-chief at HSS and team physician for the New York Giants. Dr. Warren has served in that role as team doctor now for three decades.

While at HSS, Dr. Millett twice received the Lewis Clark Wagner Award for excellence in orthopaedic research (the top resident research award), as well as the American Orthopaedic Association – Zimmer Travel Award, a national award for orthopaedic research.

Next in his career path was a fellowship in Vail. "It was at the time and, in my opinion, still is arguably the top sports medicine fellowship in the country," he says. "The time spent working with Dr. Steadman and Dr. Hawkins was very much a mentorship experience."

ON THE FACULTY AT HARVARD

From there he accepted a position at Harvard Medical School, where he practiced at Brigham and Women's Hospital and the storied Mass General (Massachusetts General Hospital). Again, he found a senior partner/mentor, Dr. Jon JP Warner, chief of the Harvard Shoulder Service.

"When I went to Boston, there weren't many good minimally invasive treatments for rotator cuff tears, shoulder instability, or for arthritic shoulders. But about that time, there was a huge technological breakthrough. Arthroscopic techniques allowed us to do all kinds of things we couldn't do before. I had received great knee arthroscopic training and skills with Dr. Steadman, and was able to transfer those skills to the shoulder."

Dr. Millett says he thought he was going to stay at Harvard forever, but five years into his stay in Boston, he got a call from Dr. Steadman asking him to consider coming back to fill the void that had been left when Dr. Hawkins moved to South Carolina.

"Dr. Steadman told me that Vail was 'the best place to practice orthopaedics.' Even when I was at Harvard, there was a part of me that thought the same thing. I accepted his offer and ten years later, I still think it's true."

"Dr. Steadman told me that Vail was the best place to practice orthopaedics. Ten years later, I still think it's true."

PROFESSIONAL RECOGNITION

During that ten years, Dr. Millett's work has often been recognized by his peers and patients. He has authored over 180 peer-reviewed, scientific articles, numerous book chapters, and four books on orthopaedics, sports medicine, and shoulder surgery. His academic work has been recognized with awards from several international societies, including the 2015 Achievement Award from the American Academy of Orthopaedic Surgeons, for his contributions to the field.

In May 2015, he was selected by *Orthopedics This Week* as a 2015 Top Shoulder Surgeon in North America and recognized for his commitment to research and clinical excellence. He has been ranked in the top one percent of orthopaedic surgeons in the U.S. by *US News and World Report*.

Considered a pioneer in double row arthroscopic rotator repair, his innovative procedures also include the *comprehensive arthroscopic management* (CAM) shoulder surgery, bone grafting for shoulder instability, humerus fracture repair, shoulder replacement surgery, and AC joint repair, as well as treatments for less common conditions such as snapping scapula syndrome and sternoclavicular instability.

BIOLOGIC TECHNOLOGY

"Now, in select patients, we are using a procedure called arthroscopic superior capsular reconstruction (ASCR)," says Dr. Millett. "It involves using biologic technology to rebuild the rotator cuff, and it will make a big difference for patients who otherwise don't have a solution to their problem."



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

The research production at SPRI has also increased dramatically over the last decade, reflected by the number and quality of publications. SPRI has received support through grants, public donations, corporate partners, and events. The number of doctors and scientists trained at SPRI continues to grow.

“With the added program in regenerative sports medicine and the positive leadership team we have in place,” says Dr. Millett, “there are lots of reasons to be excited about the future of the Steadman Philippon Research Institute.”

SHARING WITH A NEW GENERATION

“People should know that we are a world leader in orthopaedic sports medicine and a serious place for scientists and surgeons interested in advancing our field and keeping people active. The support that we get does not go into science for the sake of science. Our research has direct clinical impact,” Dr. Millett concludes. “The doctors and researchers we train here go back to their communities and countries as ambassadors for what we do, take our ideas, and spread them beyond the Vail Valley to have a global impact.”

Once the beneficiary of great teaching and mentoring, D. Millett now shares his knowledge and skills with a new generation of doctors.

“This kind of regenerative medicine, combined with methods now being researched at SPRI, is going to be the cornerstone of what we do,” he adds. “We have a reciprocal relationship with those here who are studying basic science. They make observations in animal studies or cell cultures that we can use clinically with a scientific basis for doing so. In the clinic, we’ll make observations about certain conditions and responses to treatment in patients that we can further investigate in the lab. This cross-pollination of ideas is what leads to major breakthroughs.”

Without clinical input, basic science might not have findings that translate to patient care. Without a scientific basis, what happens in the clinic would not be evidence based. At The Steadman Clinic and SPRI, it is very much a reciprocal relationship.

CHANGE AND GROWTH

Since coming to SPRI, Dr. Millett has seen and been a part of tremendous change and growth. He has now trained over 70 clinical fellows, in addition to starting and expanding the Visiting Scholars Program, having personally trained international doctors in Vail from Austria, Germany, Netherlands, France, and Mexico.

Additionally, there are always visiting surgeons who come from around the U.S. and the world to watch surgery and learn. Last year alone, there were visiting surgeons from Brazil, Norway, Finland, South Africa, Italy, United Kingdom, France, and China. Dr. Millett served as the local host for the Arthroscopy Association of North America Traveling Fellowship when they came to Vail and SPRI.

SARAH MILLETT AND COMPANY

Dr. Millett married his childhood friend and later sweetheart, Sarah, who was an economics major at Dartmouth and earned an M.Ed. at Simmons College in Boston. They “re-met” during his residency at HSS, when they literally ran into each other while jogging in Central Park. Maybe it was that destiny thing again. Married since 1999, they have three girls and a boy, all active in sports—no surprise there. As if she wasn’t busy enough at their home in Edwards, Colorado, she opened, operated, and sold three restaurants in the Vail Valley. Dr. Millett calls her “the most amazing and interesting woman I know.”

PATIENTS IN THE NEWS

WENDY WHELAN: FOCUSED FROM THE START, UNCOMMONLY ENERGETIC, EVER-CHANGING

ONE OF THE WORLD'S GREAT BALLERINAS REFLECTS ON HER CAREER, TAKES ON NEW CHALLENGES

By Jim Brown

She started dancing at the age of three and performed with the Louisville Ballet before she was 10.

At 14, she won a summer scholarship at the prestigious School of American Ballet in New York.

A year later, the teenager moved to New York to live, study, and dance. She never left.

In 1986, she became a member of the New York City Ballet, and in 1991 was named principal dancer.

Twenty-three award-winning years later, on Saturday, October 18, 2014, the world-renowned Wendy Whelan gave a farewell performance at the sold-out Lincoln Center in New York City. In the audience was an orthopaedic surgeon from Vail, Colorado. His presence at her performance, as you will soon learn, was not a coincidence.

ENERGY PRODUCES ENERGY

Among the many expressions that have been used to describe Whelan's personality are "the most modest dancer who ever lived," "disarmingly down-to-earth," "generous," "confident," "brilliant," and of course, "exceptional" and "gifted."

"She is New York's treasure," announces choreographer, dancer, and artistic director Stephen Petronio. "The longevity of her career has been astounding."

"Wendy Whelan is just an extraordinary artist," says British choreographer and director, Wayne MacGregor. "She's like a racehorse—she has this thoroughbred kind of body."

But a recurring theme surfaces when Wendy's personality is discussed. The theme is "energy," and it didn't start with her.

Her father, an accountant, was a runner in college. Wendy's mother, Kay Whelan, is a Louisville legend—Hall of Fame, mother of three, cancer survivor, ex-physical education teacher, and former high school and college basketball coach. A Louisville paper referred to her as "the incomparably energetic Whelan." Apparently, she passed that energy on to Wendy.

The New York Times reported that, as a child, Wendy had "inexhaustible reserves of energy." When she took to landing jumps on her little sister, Leigh, Kay Whelan "hauled her off" to Ginny Wooton, a Louisville ballet teacher.

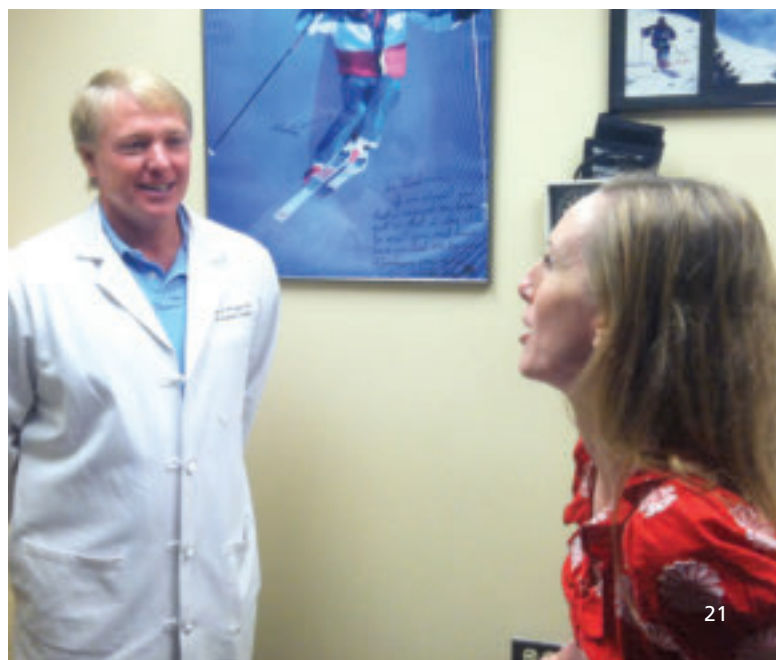
"After that," said Ginny, "Wendy was absolutely obsessed."

Sister Leigh survived those early jumps nicely and is now a homicide detective in Louisville.

"I loved playing sports as a kid," says Wendy. "I was a fast runner, did a little diving, and went to basketball camps. I dabbled in other sports, but I was always involved with ballet. I wanted to grow up to be an artist or an athlete. It was only later that I realized dance is both of those things combined."

When asked if she was ever tired after taking ballet classes and rehearsing for three to six hours before an 8:00 pm performance, she laughed at the notion.

"No, no, my motto is 'energy produces energy.' The more energy I exerted, the more energy I would get. It was always three hours of dancing a day, every day except Monday, no matter what. I felt like the Energizer Bunny."



MAKING OBSTACLES ADVANTAGES

In spite of her athleticism, artistry, and energy, success was not easy. Ballet dancers do well with slightly “turned out” hip joints. Wendy’s hips weren’t turned out.

At 12, she was diagnosed with idiopathic (adolescent) scoliosis. She wore a brace for four years, spent time in traction, and for six months was in a hip-to-shoulder body cast for her curved spine.

“I got past it,” she says, “but there was always a side that was weak and not fully symmetrical. I learned how to make that not a handicap, but an advantage. As I became an older dancer, it started to bother me again and caused some instability issues. But overall, I’ve had good musculature. I think I got some of the physicality from my grandmother.”

In 2003, she tore the plantar fascia tissue in her left foot during the middle of a performance at the Bolshoi Theater in Moscow. “I continued with the piece by staying on my toes because I couldn’t put my heel down. I altered things a little bit, but not so much that the audience would notice. We finished it, my partner carried me to dinner, carried me to the airport, and I flew home. Four months in a boot.”

More recently, she began having trouble with her right hip. She slipped during a class, then slipped again in rehearsal the same day. She also strained her hamstring twice. “Whatever it was,” she says, “my hip was never the same.”

THE SURGEON FROM VAIL

Her orthopaedist and physical therapist suspected she might have a torn labrum (the rim around the top of the hip joint). They also said that if she did have a labral tear, the only person she should consider seeing was Dr. Marc Philippon of The Steadman Clinic and Steadman Philippon Research Institute in Vail.

“I didn’t want to believe it was as bad as it was, but Dr. Philippon thought he could be helpful if I wanted to pursue surgery. It took a while, but I decided to have reconstruction hip surgery in Vail in August of 2013.”

[Dr. Philippon developed the technique and refined it through his research at the Steadman Philippon Research Institute. It is now used as standard procedure throughout the world.]

“My experience at The Steadman Clinic was phenomenal. I got there on Sunday, had surgery on Monday, and flew back to New York on Friday. The day Dr. Philippon performed the procedure, I was up, walking on crutches, and riding a bike at the hospital.”

Wendy returned to the stage in April of 2014 and performed regularly until her previously planned retirement from the New York City Ballet in October 2014. Dr. Philippon was there, as he was for a performance in April.



“I can’t put into words the level of care I received from Dr. Philippon,” says Whelan. “He is one of the warmest physicians and individuals I’ve ever experienced. He has given back to me my career and my life. He’s a force of nature.”

“When I think of The Steadman Clinic and the Steadman Philippon Research Institute,” says Wendy, “I think of a group of individuals who are in the forefront and pioneers, developing new surgical procedures and understanding the kinds of injuries that result from sports, dance, and active lifestyles.”

“They define new levels of excellence—always thinking about the future and how to make things better. They go non-stop; won’t sit still. And they are connected to physicians and researchers all over the world who are forward-thinkers at the highest level.”

THREE NEW PROJECTS

Wendy Whelan has a unique ability to continuously reinvent herself. Since her final performance with the New York City Ballet, she has moved forward with three new projects. *Restless Creature*, in which she performs separate duets with four young choreographers, began touring in January. A different performance opened in London in August, and a third will be performed in New York later this year.

Like Dr. Philippon and his colleagues in Vail, she just can’t sit still. Always going. Non-stop.

“I will continue to perform, teach, and explore my craft,” she says. “I’m thankful to Dr. Philippon for letting me continue to do that.”

THE MASTER SPEAKS

Whether you are a ballet aficionado or not, a person with whom you might be familiar offered a concise, profound observation regarding the extraordinary life and ever-changing career of Wendy Whelan.

“She’s the best.” — Mikhail Baryshnikov

In 2014, SPRI received separate gifts and support from 934 individuals, foundations, and corporations. This combined support, including special events, amounted to \$4,329,258.

The Institute is grateful to the following individuals, corporations, and foundations for their support of the Institute in 2014. Their vision ensures the advancement of evidence-based medical research and joint preservation research, science, and care, as well as the education of physicians for the future. We extend our gratitude to these supporters for their generous contributions.

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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, recognizing those individuals who have invested not only in our tomorrow, but also in the health and vitality of tomorrow's generations.

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

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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 200 SPRI 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 2013, four Chairs provided important funding for the Institute's research and educational mission. We are most grateful for the support from the following individuals:

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PATIENTS IN THE NEWS

GAIL JENSEN: A BIKE RIDE IN THE MOUNTAINS, AN ACCIDENT, AND A LIFE-CHANGING EXPERIENCE

By Jim Brown

In the summer of 2013, Gail Jensen and her husband, Richard, were in Breckenridge, Colorado, for a week of hiking and biking.

It was supposed to be fun and challenging, but not an unusual experience for the Jensens, who live in Wakeeney, Kansas. Gail had taken early retirement as an information systems and healthcare administrator. Richard had been a community banker for 30 years. It was not their first time to the mountains or engaging in rigorous activity.

“Both of us love the outdoors and spending time in Colorado,” says Gail. “We enjoy sailing, hiking, biking, and running. One of my goals is to complete my Advanced Yoga Instructor Certification. The other is to participate in another half-marathon.”

“We were biking on a trail near Breckenridge,” she continues. “I hit a rut in the trail near a wooden bridge, lost my balance, and my momentum carried me off the side of the bridge into a ravine. I fell about four feet onto my left shoulder and rolled another six feet before coming to a stop.”

Gail remembers hearing what she thought was a bone break, but she was not sure what was broken or the extent of her injuries. She was taken by ambulance to the emergency room of the St. Anthony Summit Medical Center in Frisco, Colorado.

Gail was right. Something was broken. It was the tibial plateau (upper surface of one of the two bones in the lower leg) of her left leg, and there was damage to the meniscus in her left knee, as well as lesser injuries (at the time) to her left arm and shoulder.

ENTER DR. RANDALL VIOLA

The emergency room physician that day was Dr. Randall Viola, an orthopaedic surgeon at The Steadman Clinic, who is also a medical consultant to the U.S. Ski Team and the Denver Broncos.



“Discussing my injuries and options with Dr. Viola, he immediately gained my trust and set my mind at ease,” says Gail. “I made the decision to go ahead with surgery in Frisco that evening.”

“One of the emergency room staff members told me not to worry, that I was in good hands, and that Dr. Viola was one of the ‘Best of the Best’ surgeons. He assured me that I would have a 100 percent recovery, but at the time that did not seem possible.”

“When Dr. Viola set that expectation, I expected nothing less from myself. I was determined to follow my physical therapy protocol and do the work to make a full recovery happen.”

FIRST EXPERIENCE IN VAIL

Eleven months after her accident and surgery, Gail went to The Steadman Clinic and the Vail Valley Surgical Center, where Dr. Viola removed all of the hardware from her leg. She was discharged from physical therapy after six post-surgical visits, and had full range of motion in her leg with no discomfort.

“Once my leg healed from the hardware removal procedures, I experienced no limitations with the use of my leg,” says Gail.

ENTER DR. PETER MILLETT

“As I began increasing daily activities, practicing yoga, and working out on a regular basis, I realized that the injuries to my shoulder and arm were more extensive than I thought. It was becoming increasingly painful, and I was losing strength, function, and range of motion.”

“Because of my experience with Dr. Viola and The Steadman Clinic, I could not see myself going anywhere else for treatment. Richard and I had done enough research to know that Dr. Peter Millett is not only one of the best orthopaedic surgeons and shoulder

specialists in the U.S., but in the world. I was confident that I would get the proper diagnosis and treatment, and would recover fully and quickly.”

She got her wish. Dr. Millett performed three procedures—rotator cuff healing response, subacromial decompression, and biceps tenodesis—all developed or refined at the Steadman Philippon Research Institute.

Gail’s surgery was on Thursday afternoon, March 12, 2015. Her first physical therapy session was the next morning. She says that beginning her physical therapy right away (which, by the way, was pioneered by SPRI’s Dr. Richard Steadman) was instrumental in the healing process.

“The last pain medication I needed was Friday night, March 13, at 10:00 pm.” (Remember, Gail is trained to manage information and keep records.)

“SPRI AFFECTS PEOPLE WORLDWIDE THROUGH ITS RESEARCH AND MEDICAL EDUCATION. WE ENCOURAGE THOSE WHO READ THIS TO JOIN RICHARD AND ME IN SUPPORTING SPRI AS IT LOOKS TO THE FUTURE IN PROVIDING THE BEST AND MOST INNOVATIVE CARE POSSIBLE.”

THE VIEW FROM A SPOUSE

The patient’s spouse often gets to observe how a medical facility works from a different perspective. In this case, the person was Richard Jensen.

“The culture at The Steadman Clinic is not a big city culture. They’ve created something that is spectacular. It is caring and patient-centered, and it extends from physicians to physicians’ assistants, physical therapists, staff members, and others.”

“One of the things that impressed me was the positive, caring attitude of Dr. Millett and the whole Steadman Philippon organization,” adds Gail. “Even though I was not an elite athlete, I felt that my recovery was as important to them as it was to me. They were with me throughout the whole process with a compassionate, yet motivating presence.”

Gail and Richard were also impressed by the communication between Dr. Viola, Dr. Millett, and others in Vail with the Jensens’ doctors and physical therapists back in Kansas. “My physical therapy both in Vail and at home was excellent.”

AN INTRODUCTION TO THE STEADMAN PHILIPPON RESEARCH INSTITUTE

“We did not know about the Steadman Philippon Research Institute until I became a patient at the Clinic,” says Gail. “Once we started getting the SPRI Newsletter, the Annual Report, and other publications, we became more aware of the research that makes many of the procedures at the Clinic and other medical institutions around the world possible.”

Gail says her injuries, treatment, and recovery have been a life-changing experience. Richard agrees. “This was a wake-up call for both of us. It has helped us realize the importance of staying healthy. The Steadman Clinic and the Steadman Philippon Research Institute is about keeping people active.”

“It’s important to get the message out about the good work they are doing. We are excited about being asked to share our experience,” says Richard. “We have lots of active friends who have followed Gail’s progress. Almost to a person, they have said if they need orthopaedic medical care, they hope to get it at The Steadman Clinic.”

“Returning people to their active lifestyles is made possible because of the collaboration between the Steadman Clinic physicians and SPRI,” says Gail. “Personally, I believe the injuries sustained from my accident could have resulted in a negative outcome had it not been for my skilled surgeons and their teams.”

“SPRI affects people worldwide through its research and medical education,” she adds. “We encourage those who read this to join Richard and me in supporting SPRI as it looks to the future in providing the best and most innovative care possible.”

HOW’S GAIL DOING?

When SPRI News contacted Gail in July to ask a follow-up question, this was her response: “I’m on a yoga hike in Breckenridge right now. It’s a beautiful day.”

We think that means she’s doing okay.



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

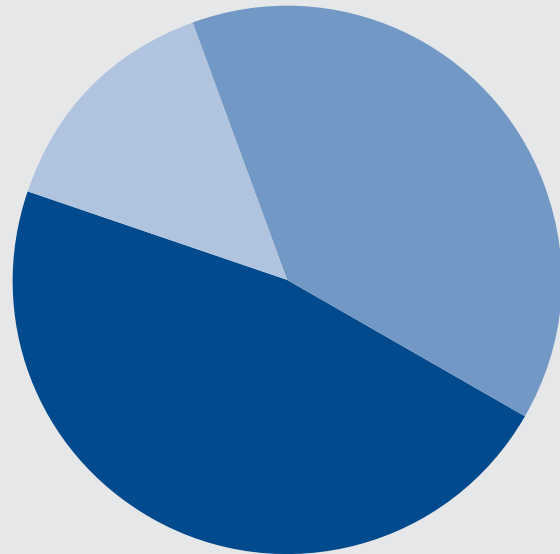
Donors at this level support many programs, including the Institute's research to validate the success of new treatments for degenerative arthritis and identify factors that influence treatment success. For example, as youth sports injuries rise to epidemic proportions due to early specialization and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

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

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THE FACE OF PHILANTHROPY IN 2014

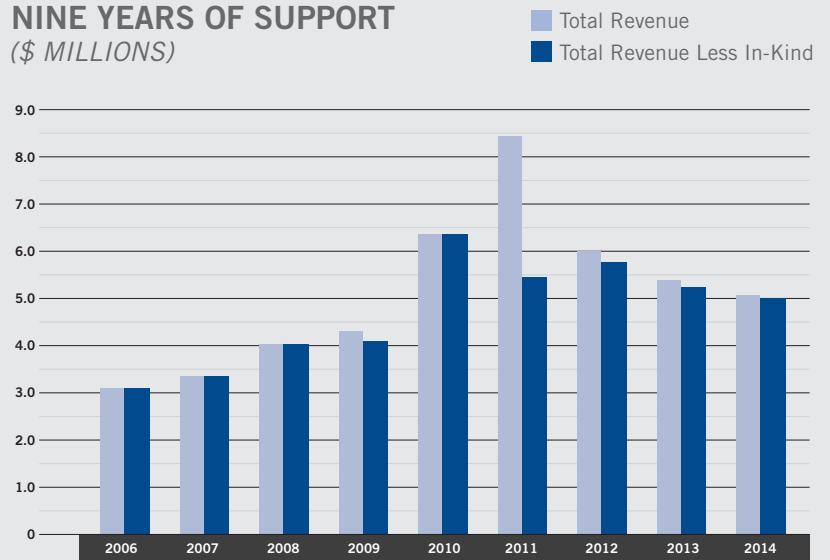


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- Family and Friends: \$2,368,516
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Corporate support helps fund our Institute's research and education programs in Vail, Colorado, and at six university sites. As we continue to deliver efficiencies, corporate funding has allowed us to direct more dollars into research. This year, 77 cents of every dollar raised went into research. The Institute is grateful for the generous support of our corporate partners. In 2014, we received \$1,956,619 in corporate support. This work will benefit patients and physicians for generations to come.

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Mr. and Mrs. Mitch Hart
The Fred and Elli Iselin Foundation
Mr. and Mrs. Jay Precourt
Mr. and Mrs. Stewart Turley



THE YEAR IN RESEARCH AND EDUCATION

CENTER FOR REGENERATIVE SPORTS MEDICINE

In late 2014 and early 2015, plans for a new Center for Regenerative Sports Medicine (CRSM) began to unfold. On May 1, 2015, SPRI appointed Johnny Huard, Ph.D., as its chief scientific office and director of the Center.

Dr. Huard is a world-renowned expert in the field of stem cell research who has extensive expertise in gene therapy, tissue engineering, and regenerative medicine applications based on the use of muscle-derived adult stem cells. Dr. Huard's primary area of interest is in developing methods to use stem cells to aid in the healing and regeneration of a variety of musculoskeletal tissues.

AREAS OF FOCUS

Specifically, the Center's initial research will focus on 1) the effects of exercise and neuromuscular stimulation/massage on tissue repair after injury; 2) delaying joint degeneration through the injection of adult stem cells and other biologics; 3) healing musculoskeletal tissue with customized platelet-rich plasma (PRP) and stem cells; and 4) measuring the effects of anti-fibrotic agents on tissue repair.

The concept of regenerative medicine for sports applications began decades ago when Dr. Richard Steadman started developing techniques and procedures to preserve joints instead of replacing them. The doctors at The Steadman Clinic and the physicians and scientists at SPRI have extended the legacies of Dr. Steadman and Dr. Philippon by their achievements in multiple areas.

TRANSLATIONAL AND REGENERATIVE MEDICINE

One of those doctors, William G. Rodkey, D.V.M., has led SPRI's initiatives in translational and regenerative medicine research in the past and continues his work in this critical arena.

In 2014, the purpose of our research was to gain a better comprehension of factors



On May 1, The Steadman Philippon Research Institute welcomed Dr. Johnny Huard as Chief Scientific Office and Director of SPRI's Center for Regenerative Sports Medicine.

Dr. Huard's team left to right includes:

XUEQIN GAO, M.D., PH.D.; BARBARA LIPARI; KENDRA SAYLES; YONG LI, M.D., PH.D.; PING GUO, PH.D.; SUDHEER RAVURI, PH.D.; JEFF GREEN; AIPING LU, M.D.; JEN ROGUS; ANDI LIEBOWITZ; GARY PETERSON; BILL RODKEY, D.V.M.; RYAN WARTH, M.D.; WALTER LOWE, M.D.; JEANNIE ZHONG; LIZZIE MORRIS; ALEX SCIBETTA; JIM CUMMINS; MARC PHILIPPON, M.D.; JOHNNY HUARD, PH.D.; XIADONG MU, PH.D.

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 treatment modalities.

The emphasis has been on understanding the effects of injuries and applying this understanding to enhance therapies at the joint, tissue, and even cellular levels. The research is performed in vitro (laboratory) and in translational (animal) studies before human use. The ultimate goal is to regenerate, not just repair, injured tissues. That is, the focus is on regenerative medicine.

The relatively new, but rapidly expanding, area of regenerative medicine, coupled with biological enhancement of tissue healing is an exciting one that has gained global attention, especially in the areas of orthopaedic sports medicine and in the care of combat casualties from our military services. Many of the applications lend themselves to

treatment of posttraumatic osteoarthritis and other degenerative conditions.

There are many new and innovative techniques under investigation by scientists around the world, including the use of adult stem cells from various parts of the body, blood products such as PRP, and synthetic materials that exploit new sciences such as 3D printing, nanotechnology, and electrospinning. One of the broad goals of this work can be stated simply as joint preservation.

ACCOMPLISHMENTS

- Four publications in quality peer-reviewed journals and books
- Thirteen presentations in six different countries
- Served on two major international research committees
- Served on the editorial board of directors of a major knee journal

- Served as a peer reviewer for four major orthopaedic sports medicine journals
- Completed important studies and/or published articles on adult autologous stem cells, meniscus repair and regeneration, and the microfracture technique and rehabilitation

PUBLICATIONS

In 2014, the department had four publications in high-quality journals and leading textbooks, including:

- *American Journal of Sports Medicine*
- *Arthroscopy Journal*
- *Operative Techniques in Orthopaedic Surgery*
- *International Cartilage Repair Society Cartilage E-Book*

GRANTS

No outside grants or patents were obtained in 2014. Philanthropic donations were solicited for and used specifically for some of the studies.

COLLABORATIVE INITIATIVES

CRSM continued its very strong and extremely well established collaboration with Colorado State University (CSU). Specifically, we worked closely on many projects with the CSU Orthopaedic Research Center (ORC) under the direction of Dr. Wayne McIlwraith and his deputy, Dr. David Frisbie.

Our collaborations have been ongoing for 20 years, and our joint efforts have led to publications and presentations on the subject of cartilage repair and resurfacing. Several of these studies have influenced the way that microfracture is performed, and other studies have validated the postoperative rehabilitation protocols that have been developed by Dr. Steadman. This collaboration with the CSU ORC is truly invaluable to CRSM and to SPRI as an institute.

One ongoing collaborative study in particular is worthy of note. A laboratory study was done to assess the effect of the timing of administration of stem

cells to pieces of articular cartilage that were subjected to a mechanical injury. This mechanical injury model has been validated previously by Dr. Frisbie and co-workers at the CSU Orthopaedic Center.

In the completed study we added interleukin-1 (a naturally occurring inflammatory protein that is increased in living joints following traumatic injury and promotes the degenerative osteoarthritic process) to emulate the combination of inflammation that accompanies direct injury in traumatic joint disease. Use of this now proven successful laboratory model will save a great deal of money and laboratory animal resources over traditional live animal studies.

This successful in vitro model permits more studies to be done much more quickly, and the number of test products and testing protocols is significantly increased. Our initial findings confirm that this traumatic impact model with the addition of interleukin-1 provides a model that very closely mimics the joint environment in human patients following, for example, a ski injury. These findings now have made it possible to design additional ongoing studies.

We have also learned from this study that the timing of when stem cells are administered seems to have no effect on results. This finding is important to know as we work toward having donor stem cells "on the shelf" for use at any time. We will continue to use this model with greater frequency and for more potential therapeutic applications.

The Center continues to collaborate with The Steadman Clinic attending staff and the fellows. This collaboration is always fruitful and helps us ensure that our work is clinically focused.

PROJECTIONS

The future looks very bright for regenerative medicine. The Center for Regenerative Sports Medicine can truly make a difference in this area of biomedical and orthopaedic sports medicine research. These future efforts will be greatly expanded into the coming years with the 2015 addition of Dr. Johnny Huard, a world-class scientist in the regenerative therapeutics arena. Some of the areas we will continue to pursue include:

- Functional tissue engineering
- Synthetic matrices
- 3D printing
- Gene therapy
- Cellular therapy
 - Stem cells, circulating progenitor cells, others
- Platelet-rich plasma (PRP)
 - Mechanisms of action, dose optimization, etc.

All of these projects focus on improved tissue healing and regeneration. The discipline of regenerative medicine is not only the future, it is also right now.



DR. PETER MILLETT'S STUDY SHOWS THAT ARTHROSCOPIC ROTATOR CUFF REPAIR IS EFFECTIVE IN OLDER ATHLETES

A study led by SPRI's Peter Millett, M.D., M.Sc., is the first to provide direct evidence that arthroscopic shoulder surgery for the repair of rotator cuff injuries is effective for recreational athletes in their 70s and 80s.

"Rotator cuff repair surgery decreased pain and improved function," says Dr. Millett. "The procedure was effective in helping patients function not only in daily activities, but also in sports and activities that make life meaningful."

Dr. Millett is an internationally recognized orthopaedic surgeon and partner at The Steadman Clinic who specializes in disorders of the shoulder and other sports-related injuries. He has been consistently selected as one of the "Best Doctors in America."

The results of the study were featured in a presentation at the recent meeting of the Arthroscopy Association of North America in Los Angeles, and the findings were published in the *The American Journal of Sports Medicine*.

Titled "Two-Year Outcomes After Arthroscopic Rotator Cuff Repair in Recreational Athletes Older Than 70," the study was co-authored by Sanjeev Bhatia, M.D., Ryan Warth, M.D., Joshua Greenspoon, B.Sc., and Marilee Horan, M.P.H., coordinator of upper extremity research at SPRI's Center for Outcomes-Based Orthopaedic Research.



EFFECT ON OLDER RECREATIONAL ATHLETES

"Many older patients who have rotator cuff tears have significant pain, limitations in function, difficulty with sleep, and cannot play the sports they enjoy," explains Dr. Millett. "When they go to the doctor, they are often told that surgery is not an option, that they are 'too old,' that surgery is ineffective, or that they won't be able to return to sports after surgery. That is not what they want to hear."

The SPRI investigation involved 49 shoulders in 44 patients of Dr. Millett who described themselves as recreational athletes and had undergone a primary or revision arthroscopic repair of a full-thickness supraspinatus rotator cuff tear.

[The supraspinatus is one of the four rotator cuff muscles. The muscle is located on the top of the shoulder and its tendon attaches to the humerus so that one can elevate and rotate the arm.]

Many factors affect patient outcomes after arthroscopic rotator cuff repair, including age, gender, occupation, a chronic or traumatic tear, and length of time patients are followed. The SPRI study evaluated the effectiveness of rotator cuff repair specifically among patients in their 70s and 80s.

ROTATOR CUFF INJURIES: HOW DO YOU KNOW?

Patients with rotator cuff issues often notice pain when reaching and with overhead activities. Rotator cuff tears are often very painful at night and it is often painful to sleep on the injured shoulder. There may also be weakness when reaching overhead, clasping hands behind the neck, or elevating the arm to the side.

A visit to the orthopaedic surgeon starts with a careful history and then a shoulder physical examination, which may provoke pain and weakness. The physician will order x-rays that may show a bone spur that can impinge on the underlying rotator cuff tendons. An MRI is the best test to visualize the actual tendons of the rotator cuff. In active patients, arthroscopic surgery is generally preferred to decrease pain and restore function, as tendons will not heal on their own.

1,300 ROTATOR CUFF REPAIRS

Dr. Millett has performed more than 1,300 arthroscopic rotator cuff repairs since 2005, and results in his overall cohort have had revision surgery rates of less than three percent. Many of these patients fall into the 70+ category and most of them are extremely active. Older individuals have shown an increasing desire to remain physically active as they age, and many patients over the age of 70 still have expectations of high levels of function and activity.

Concerns have existed about repairing rotator cuff tears in this age category. Older patients tend to have larger tears with more degenerative changes in their tendons, which can increase the complexity of repair. Bone quality decreases with age and can complicate suture anchor fixation. Vascularity and healing can also be compromised in older patients. These and other factors make rotator cuff repair more challenging and clinical outcomes less predictable in this age category. This study, however, shows that carefully selected patients over 70 can and do achieve excellent outcomes with arthroscopic surgery when it is combined with appropriate postoperative rehab.

FOUR BENEFITS

All postoperative outcome measures demonstrated significant improvement when compared with baseline scores prior to surgery. Pain was decreased and function was increased. None of the patients needed further surgery. Patients were highly satisfied with their outcome. Moreover, 77 percent of the patients who responded were able to return to their desired sports at a pre-injury level of intensity or greater.

“Our study showed that 1) older patients can and do benefit from arthroscopic rotator repair surgery, that 2) arthroscopic rotator repair reliably eliminates pain, that 3) the procedure effectively restores function, and that 4) older patients can and do return to sports after rotator cuff repair,” says Dr. Millett.

Dr. Millett emphasizes that the expertise of the entire team caring for patients, from the surgeon to those who supervise rehabilitation, plays a big role in the outcome.

“We offer patients who have suffered rotator cuff injuries an effective option—arthroscopic surgery—one that meets the patients’ expectations,” concludes Dr. Millett. “The procedure and the results of this study fit perfectly with our mission of keeping people active.”

The Steadman Philippon Research Institute is grateful to Paul and Lee Schmidt, who partially funded this study with a grant.



Illustration showing a completed extended linked double-row rotator cuff construct.



Left, a typical crescent-shaped tear. Right, standard four-anchor double-row construct to repair a crescent-shaped tear.



New arthroscopic interconnected suture double-row repair technique (transosseous equivalent technique TOE) that may help chronic tendons heal better given the larger surface area and compression of the tendon with a double row of sutures that are interconnected with suture anchors.

CENTER FOR OUTCOMES-BASED ORTHOPAEDIC RESEARCH (COOR)

KAREN K. BRIGGS, M.B.A., M.P.H., DIRECTOR; ASHLEY WILSON, DATA COLLECTION COORDINATOR; GRANT DORNAN, STATISTICIAN; MARILEE HORAN, M.P.H., COORDINATOR OF UPPER EXTREMITY RESEARCH; LAUREN MATHENY, COORDINATOR OF LOWER EXTREMITY RESEARCH; DAWN ROSSI, ADMINISTRATIVE ASSISTANT; SHANNEN MCNAMARA, RESEARCH ASSOCIATE

As COOR enters into its 23rd year of data collection, our success, as with our data, continues to grow. We are one of the few sports medicine practices in the world that collect data. In addition, we collect data on every patient, not just those enrolled in special studies.

The goal of our data collection is to improve patient outcomes and satisfaction. Our papers continue to be accepted by top journals and are often considered top references for papers. For example, manuscripts that Dr. Steadman has authored have been cited over in over 6,500 research articles. Below is a summary of some of the research completed in 2014.

SHOULDER RESEARCH

Results of arthroscopic rotator cuff repair in recreational athletes over 70 years of age two years after surgery

The COOR staff reviewed data on 49 men and women who had undergone arthroscopic surgery to repair a full-thickness rotator cuff tear. The subjects were 70 or older and described themselves as recreational athletes.

Researchers collected demographic data, surgical data, and preoperative and



postoperative clinical outcome scores. Results showed significant improvements in all measurements of shoulder function at an average of 3.6 years after surgery. The study also found a significant improvement in pain with activities of daily living, recreational sport, and sleep.

The study revealed that arthroscopic rotator cuff repair was highly effective at reducing pain and improving function, and returning patients who are typically

treated non-operatively for rotator cuff issues to sport. Overall, 77 percent of patients were able to return to their recreational sport at pre-injury levels.

This study was presented at the American Orthopaedic Society for Sports Medicine's Annual Meeting and at the Arthroscopy Association of North America. The paper was published in the *American Journal of Sports Medicine*.

Arthroscopic surgery effective for instability of the shoulder

A study evaluated the effectiveness of arthroscopic surgery for multidirectional instability (MDI) of the shoulder. While the first-line treatment for the condition is typically supervised physical therapy, this approach is unsuccessful and patients remain disabled.

COOR examined 41 athletes who received arthroscopic surgery for MDI— 22 men and 19 women, with a mean age of 23.7 years. All had failed a non-operative treatment of a supervised exercise.

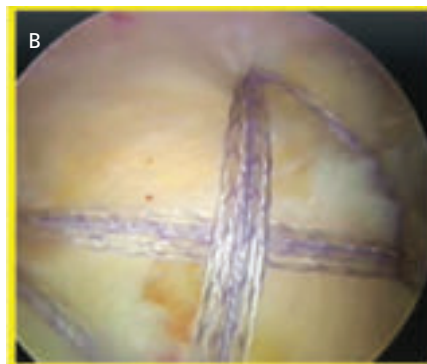
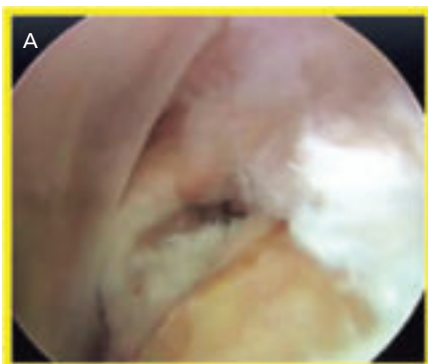


Figure 1. (A) Crescent-shaped tear in 73-year-old man who skis 100 days per year. (B) Double row cuff repair.

Improvement in outcomes was more predictable and more consistent for those who had a traumatic onset to their instability, but those who had shoulder instability without a traumatic event had significant improvement from surgery .

Three years following surgery, 73 percent returned to play at an equal or only slightly lower level than before the injury. The study found return to play was high in all patients, but was more likely in athletes whose shoulder instability was traumatic in onset versus atraumatic in onset.

MDI Patients Sporting Activity	# Patients
Alpine skiing/Snowboarding	14
Swimming/Volleyball/Golf	9
Baseball/Softball	3
Kayaking	3
Football/Hockey/Rugby	7
Other (martial arts/extreme fitness hiking/skateboarding/soccer)	5

“A study like this is significant because prior research has shown that non-surgical approaches to this type of injury have less than optimal results. We now know that arthroscopic surgery can be an effective and safe treatment method for these patients, decreasing pain, restoring function, and getting them back to sports and other important activities of life,” noted Dr. Millett. “However, more research is needed, but the results of this study certainly support arthroscopic surgery for the treatment of MDI.”

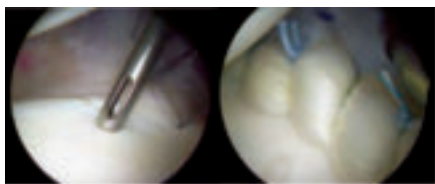


Photo of arthroscopic 360° plication of the labrum around the glenoid in the shoulder joint. The photo on the left shows a flattened labrum either due to congenita malformation or repeated dislocations and the photo on the right shows how the labrum height is restored with the suture plications.

This study was presented in July at the American Orthopaedic Society for Sports Medicine’s Annual Meeting. It was also highlighted by several press interviews in 2015, including those in *AOSSM News* and *Healthday’s Physicians Briefing*. The paper has been submitted for consideration to the *American Journal of Sports Medicine* in 2015.

Clinical results following non-operative management for grade III acromioclavicular joint injuries: Does eventual surgery affect overall outcomes?

A study was conducted to compare outcomes in patients with grade III acromioclavicular (AC) joint injuries and successful non-operative management to those who failed it and underwent secondary surgery. Many surgeons recommend early operative management for grade III AC in high-level athletes and manual laborers, in addition to those who have become chronically symptomatic.

The study found that a trial of non-operative treatment is reasonable, as successful outcomes can be expected even in those who eventually opt for surgery. Patients who sought treatment more than 30 days after their injury were less likely to complete non-operative treatment successfully.

The Center for Outcomes-Based Orthopaedic Research won a major international research award for this study given by the Society for Arthroscopy and Joint Surgery. This paper was presented with the 2015 AGA Congress Medi Award. The award is presented to the best scientific paper on the subject of clinical treatment of



X-ray of acute left acromioclavicular (AC) joint dislocation (grade III) as evidenced by the upward separation of clavicle from the coracoid process (see yellow lines). Fluoroscopic views show the same patient after AC reconstruction using tendon graft with addition of two metal buttons on top clavicle and the undersurface of the coracoid process to help hold the AC reduction while the AC joint-tendon reconstruction heals.

joint injuries and diseases or rehabilitation after arthroscopic procedures.

The paper has been given a podium presentation spot at the upcoming European Society for Sports Traumatology, Knee Surgery and Arthroscopy meeting in Barcelona. By 2015-2016, the paper will have been presented as a podium at five national and international meetings.

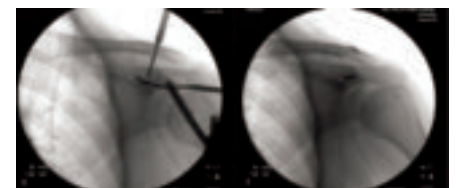
ANKLE RESEARCH

Use of cartilage extracellular matrix and bone marrow aspirate concentrate in the treatment of osteochondral lesions of the ankle bone

One criticism of microfracture is that the osteochondral lesion may heal as fibrocartilage, a rougher cartilage with inferior wear characteristics, rather than healthy hyaline articular cartilage. The purpose of this paper was to introduce a technique that uses biological substances, including cartilage extracellular matrix (ECM) and bone marrow aspirate concentrate (BMAC) to augment the microfracture technique in hopes of producing a more hyaline-like cartilage.

Seven patients, 18 years or older, underwent this procedure. All patients completed a preoperative and postoperative questionnaire. One patient underwent subsequent ankle arthroscopy at seven months for pain and arthrofibrosis. Overall, patients showed significant improvements in all measurements.

Although this study provides preliminary outcomes, such short-term outcomes are



necessary to determine whether the use of cartilage ECM is a viable treatment option for patients with osteochondral lesions of the talus.

Diagnostic accuracy of 3.0 Tesla magnetic resonance imaging for the detection of articular cartilage lesions of the ankle bone

The purpose of this study was to determine the accuracy of 3.0 Tesla (3T) magnetic resonance imaging (MRI) in detecting articular cartilage lesions in the talus (large bone of the ankle) using multiple measurements and values.

Seventy-eight patients who received a 3T MRI exam of the ankle and underwent subsequent ankle surgery were included. All exams were read by a fellowship-trained musculoskeletal radiologist, and arthroscopic examination was subsequently performed by a single surgeon.

Upon analysis, 3T MRI demonstrated a sensitivity of 71 percent and a specificity of 74 percent. The positive predictive value was 37 percent and the negative predictive value was 92 percent. The sensitivity and specificity levels were acceptable for detection of grades 3 and 4 articular cartilage lesions of the talus.

This study marks a significant improvement in sensitivity compared to that of 1.5T MRI, which was only 49 percent. Additionally, this study is among the first to use 3T MRI for the detection of ankle articular cartilage lesions in live patients.

KNEE RESEARCH

Comparing autograft to allograft outcomes following ACL reconstruction

The purpose of this study was to determine if outcomes following ACL reconstruction with bone-patellar tendon-bone (BPTB) autograft (patient's own tissue) are similar to those of BPTB allograft (tissue from a cadaver).

One hundred and ninety-one patients 18 to 70 years old who underwent ACL reconstruction were included in the study.

No autografts required ACL revision, whereas 11 patients required an ACL revision surgery in the allograft group. There was no significant difference in pain, function, activity level, or patient satisfaction with outcome between groups.

Patient satisfaction was high for both groups. ACL reconstruction using BPTB autograft or allograft produces similar outcomes.

This study aids physicians in improving communication with patients regarding what to expect following an ACL reconstruction procedure. Overall, it will help patients understand the advantages and disadvantages associated with each graft type.

Outcomes following fibular collateral ligament reconstruction

This study looked at the outcomes of anatomic FCL reconstruction with a hamstring graft in 49 patients at an average follow-up of 2.7 years from the time of surgery. There was a significant improvement in all subjective outcomes scores, indicating that patients' function and activity levels increased as a result of the FCL reconstruction. Improved patient outcomes were reported in patients with isolated FCL tears and FCL tears that were combined with other ligament or cartilage injuries requiring surgery.

This study showed that anatomic FCL reconstruction using a hamstring graft is durable and reliable, and produces satisfied patients years after their surgery.

HIP RESEARCH

Clinical outcomes after arthroscopic hip labral repair using looped versus pierced suture techniques

Two types of sutures are commonly used to tie the torn labrum to the acetabulum. Previous research has not shown either suture to be better. A study done at SPRI looked at two types of sutures used by Dr. Philippon. The study showed that the looped suture produced 70 percent of the fluid pressurization that a normal labrum produced, while the through suture



A looped suture passes a loop around the labral tissue to secure it to the acetabular rim.



A through suture technique involves passing the suture through the labral tissue and then securing it to the acetabular rim.

produced 134 percent, and when both were used, 102 percent of the normal fluid pressurization was produced.

The goal of the current study was to determine if using just the through suture, just the looped suture, or the combination of sutures resulted in different outcomes. Data was collected on 452 patients who had hip arthroscopy performed by Dr. Philippon between 2009 and 2011.

Despite observed differences in the amount of fluid pressurization produced, the outcomes using the three techniques were all the same. With no differences in outcome, picking the type of suture technique can be made based on which works best in the surgical situation.

This study highlights SPRI's unique opportunity to match biomechanics with patient-centered outcome studies. The paper was published in the *American Journal of Sports Medicine*.

Hip strength deficits in patients with symptomatic femoroacetabular impingement and labral tears

Symptomatic femoroacetabular impingement (FAI) is a common cause of hip pain and decreased function in young adults. Patients with FAI report varying

degrees of pain, weakness, and inability to participate in athletic activities. Loss of strength may contribute to the patient's decreased function and increased symptoms.

Loss of strength in the hip may be an important factor in why patients have decreased function. A loss of only 10 percent of hip strength can result in patients suffering disability. If the loss of strength could be addressed before hip arthroscopy for FAI, there is a potential that patients may recover function earlier and have better outcomes.

A study was conducted to determine the prevalence of hip strength loss in patients with FAI on one hip. The hip with FAI was then compared to the other, normal hip. We hypothesized that strength deficits would be identified in most hips with symptomatic FAI when compared to the opposite extremity, and these deficits would correlate with decreased function.

Loss of strength of more than 10 percent was present in 92 percent of patients. These patients had FAI and a labral tear. Loss of strength was associated with decrease in function and the size of the labral tear. An understanding of hip strength deficits in patients with FAI has important implications for treatment and rehabilitation strategies.

Identifying these strength losses may allow for focused rehabilitation on areas of weakness, which may improve outcomes following hip arthroscopy.

In conclusion, loss of hip strength is common in patients with FAI and occurred most commonly when the hip was abducted and flexed. Strength deficits in hip flexion were associated with decreased function, loss of motion, and larger labral tears in patients with FAI and labral tear. This paper is published in *Arthroscopy*.

Reconstruction of the hip capsule

Several years ago, Dr. Philippon developed the labral reconstruction technique for patients who had lost part or all of their labrum. This technique was successfully validated with patient outcomes published by SPRI.



The technique Dr. Philippon developed uses a piece of hamstring tissue, which is folded in a square patch the size of the capsular defect.

In 2014, Dr. Philippon developed a new technique for patients who have large tears or missing pieces of their hip capsule. The hip capsule keeps all the fluid in the joint and helps keep the joint stable. When it does not function because of holes, the general health of the joint is affected. The synovial fluid has nutrients for the hip cartilage and tissue, and when the capsule cannot maintain this fluid, the health of tissue is decreased. In addition, the tissue helps hold the joint together, creating a vicious cycle. Patients reported instability of their hip when they had a deficient capsule

During routine hip arthroscopy, a small slit is placed in the capsule to help move the arthroscope around the hip to improve visualization. Following arthroscopy, this hole normally is closed. However, in some cases, surgeons do not close this slit. This leads to the hole growing in size, the capsule tissue becoming deficient, and eventually the capsule ceasing to function. The MRI in Figure A shows a hole in the capsule (white arrow). This is one common cause of loss of capsular function and is the main setting in which a capsular reconstruction is performed.

Management of the hip capsule at the completion of hip arthroscopy is growing in interest in the sports medicine literature. Not addressing the capsular defect resulting from the capsulotomy, particularly in its thickest region, can result in persistent, symptomatic micro-instability in the operative hip in certain cases. Although cases of subluxation (partial dislocation) and dislocation after hip arthroscopy are rare, they must be avoided.



This patch is sewn onto the remaining capsule and the hole (white arrow) is patched. This helps the capsule maintain stability and improves fluid mechanics.

Seen primarily in patients having revision hip arthroscopy, capsular defects can lead to micro-instability and cause recurrent stress at the chondrolabral junction. Because of the loss of tissue, repair can be challenging. Therefore reconstruction may be the best possible surgical solution for this problem. Early outcomes following this technique have shown high patient satisfaction and patients have been able to return to a high level of sports.

DEVELOPMENT OF HIP ROBOTICS RESEARCH

The Department of BioMedical Engineering (BME) at the Steadman Philippon Research Institute (SPRI) continues to establish the leading edge of orthopaedic research. The Department of BME has a proven track record of high-quality publications, awards, and presentations in all areas of orthopaedic research. Robotics research, one of the most specialized methodologies of the Department of BME, continues to be a key component of the department's success and international reputation.

The robotic equipment at SPRI is extremely useful to researchers and provides a means to investigate and answer research questions through a testing medium capable of reproducing the natural movement of joints. Until now, the field of orthopaedic research has been in need of a validated robotic testing system for the hip joint. The importance of a validated robot system cannot be overstated and is necessary as the foundation for all subsequent robotics research of the hip joint. As such, the Department of BME engineers have recently completed a thorough validation of SPRI's robot for hip joint testing.

Drs. Philippon and LaPrade of The Steadman Clinic are particularly proud of this accomplishment and excited for the research opportunities that are now available with the development and validation of the robotic system for hip joint testing. In particular, the hip joint is naturally complex and previously required various simplifications for research. For example, because

of its ball-and-socket nature, the hip is naturally capable of complex, multidirectional movement; however, previous research experiments were constrained by testing equipment to only analyze one motion or a limited range of motion of the hip joint.

In contrast, a robotic system possesses the necessary flexibility to reproduce the multidirectional movement capability of the hip joint. Furthermore, robotic systems provide excellent accuracy and repeatability for biomechanical testing and are therefore a very capable and trusted tool for orthopaedic research.

The excitement and promise of groundbreaking hip robotics research has not suppressed a strong commitment to other joints. Notably, the knee has been and continues to be studied in detail and with prestigious external recognition. In 2014, the BME team received the American Orthopaedic Society for Sports Medicine (AOSSM) Excellence in Research Award for robotics research of posterior cruciate ligament (PCL) reconstruction procedures.

Robotics research within the Department of BME continues to support the mission at SPRI of keeping people of all ages physically active through orthopaedic research and education. The development of a validated robotic system for hip research is certain to advance our understanding and ability to treat a very important and complex joint and ultimately lead to improved surgical procedures for hip pathology and improved patient outcomes.



DR. ROBERT LAPRADE RECOGNIZED BY PATIENTS AND PEERS AS A “TRUE CLINICIAN-SCIENTIST”

By Jim Brown

Of the approximate one million physicians in the United States, less than one-half of one percent are actively engaged in research, and even fewer have the opportunity to participate in research-oriented education and mentorship programs.

Dr. Robert LaPrade, M.D., Ph.D., chief medical officer and co director of the Sports Medicine Fellowship Program at the Steadman Philippon Research Institute, and his colleagues practice medicine, conduct research, teach, and mentor physicians on a daily basis.

“My passion for research started during my residency program,” says Dr. LaPrade, who also serves as an orthopaedic complex knee and sports medicine surgeon at The Steadman Clinic. “It became clear as I was doing research that it was helping me answer questions and become better as a practicing physician.”

“As I continued to practice, I also began to realize how much I enjoyed being a mentor. Over the past 10 years it has been extremely rewarding for me to help place young doctors into top residencies, fellowships, and orthopaedic practices.”

SHARING THE WEALTH

“This “sharing the wealth” approach to medical practice, research, and mentoring has been beneficial in multiple areas. The Steadman Philippon Research Institute attracts enthusiastic researchers from all over the globe. Together, working with them we are able to produce high-quality research from which we all can learn. It is a symbiotic relationship.”

One of Dr. LaPrade’s former students and colleagues, Coen Wijdicks, Ph.D., had this to say about Dr. LaPrade’s influence on his life. “I can never repay all of the mentorship, support, and friendship that I have received from Dr. LaPrade. He has supported my career from a hungry graduate student to a passionate director. Dr. LaPrade has expanded my understanding within and beyond orthopaedic sports medicine, and I will forever appreciate this.”

Dr. Wijdicks is former director of the Department of BioMedical Engineering at SPRI and is now European director of research for Arthrex, a global orthopaedic device company. Dr. Wijdicks is based in Munich, Germany.



BEGINNING IN MINNESOTA

Simultaneously practicing, researching, and mentoring began at the University of Minnesota, where Dr. LaPrade was a professor in the departments of orthopaedic surgery and biomedical engineering. It was there that he was recognized for his collaboration with one of Europe’s top sports centers, the University of Oslo and the Norwegian Olympic Center, and where he met his future friend and colleague, Dr. Lars Engebretsen.

Dr. Engebretsen, M.D., Ph.D., is now a professor and director of research at Orthopaedic Center, Ullevaal University Hospital and University of Oslo Medical School, and professor and co-chair of the Oslo Sports Trauma Research Center.

“Dr. LaPrade joined me at the University of Minnesota in the mid-nineties when I was working as a professor in orthopaedic and sports medicine there,” remembers Dr. Engebretsen. “He came because of his love for research and actually, ice hockey. When I moved back to Norway in 1996, we established a friendship and working relationship that has proved viable over all these years.”

“His contribution to orthopaedic science was highlighted by the OREF award, and he is continuing to do clinically relevant research in a very productive environment. He is also helping Norway to educate residents and researchers through our network. He is a true clinician-scientist.”

PROLIFIC PRODUCTION

The OREF Clinical Research Award, considered the Nobel Prize of Orthopaedics, was not Dr. LaPrade's first award and is not likely to be his last. He has published more than 200 peer-reviewed scientific manuscripts and 75 book chapters, and has given more than 750 professional presentations, symposia, and instructional course lectures.

Often referred to as a "Doctor's Doctor," he has been selected as "One of the Best Doctors in America" and "One of the Most Compassionate Doctors."

"He has changed and revolutionized the manner in which complex knee injuries are treated," says Clifton Willimon, M.D., an orthopaedic surgeon and sports medicine physician at Children's Orthopaedics of Atlanta who trained as a fellow under Dr. LaPrade's guidance at SPRI. "Dr. LaPrade is the ultimate surgeon. He is blessed with talented hands, an inquisitive mind, a passion for excellence, and compassion for his patients. Every decision he makes in the operating room is backed by research and evidence."

Dr. LaPrade and his team conduct 20-30 research initiatives at any given time. In 2014 alone, he had 52 publications listed on PubMed—an average of one a week for 12 months.

"The team I had was extremely productive," he says. "That is probably more important than the person overseeing things. They are the ones doing the leg work on a daily basis."

THE STEADMAN LEGACY

"One of the most important ways in which Dr. Steadman's legacy is being carried on is through the Research Institute itself," says Dr. LaPrade. "Dr. Steadman put a great deal of time, resources, and effort into establishing the Institute at a time when not many people in the world were willing to embark on such an endeavor. The Institute went from a very small beginning to one that is now recognized as one of the top two or three orthopaedic sports medicine research centers in the world."

THE MOVE TO COLORADO

"The people at SPRI had been talking to me for several years about making a trip to Vail to visit The Steadman Clinic and SPRI, but the timing was not right," says Dr. LaPrade. "When I reached the point where we could make a move that wouldn't be too disruptive to my family, we began to seriously consider the opportunity."

"It's not too often that a place like The Steadman Clinic and the Steadman Philippon Research Institute call asking you to help run their research program, as well as their fellowship program. I looked at it as an opportunity to improve what I do and also have more resources to teach others and conduct higher level research."

MAKING THE BEST BETTER

When he began his work at SPRI in 2010, he was pleasantly surprised. "The fellows were top-of-the-line, by far. I knew we had good fellows, but I didn't realize that we had the best fellows. Our sports fellowship program is one of the most sought after programs in the United States. It is a pleasure for me and my colleagues to play a role in the advanced training of some of the top orthopaedic surgeons in the country."

"The second thing I was really happy with was the ability to do research at a more productive and efficient level. Projects which may have taken five to seven years previously are realized in one or two years here. We have more projects and more resources to engage in our projects."

Dr. LaPrade also comments on the technological advantages available at SPRI. "We have equipment other centers do not have. Our robot is one of only eight in the world. Our bi-plane fluoroscopy system allows us to evaluate patients before and after surgery, and measure with precise accuracy the changes achieved by surgery can restore patients back to living active lives."

WHERE DO RESEARCH IDEAS ORIGINATE?

Dr. LaPrade admits that he literally dreams about new projects, and he gets other research ideas while he's hiking, but most come from pathology that he sees in surgery and topics presented at professional meetings.

When does he have time to write? "One or two hours at night, most weekends, and during a scheduled two-hour academic time each Wednesday morning—Starbucks, 7:00 to 9:00 am. I'm very productive there."

PRACTICAL APPLICATIONS

One area of Dr. LaPrade's research involves a meniscus root tear, a condition that was not recognized until the past five or six years.

"We found out that this injury was occurring in eight to ten percent of patients who have a torn meniscus, and that particular tear seems to result in a very fast onset of arthritis if not treated."

SPRI research found different ways to repair meniscus root tears, which is particularly important among those in the 50-65 age group.

“Now we’re finding that we can arrest the arthritis and prevent its development,” says Dr. LaPrade.

He thinks that biologics—using stem cells, certain formulations of platelet-rich plasma, and growth factors as diagnostic, preventive, or therapeutic agents—will be the next big breakthrough in orthopaedics and other medical fields

“It could be almost as significant as when surgery went from open to arthroscopic techniques,” says Dr. LaPrade.

THE REWARD

“The most gratifying part of my job is when a patient who first arrived in a wheelchair, discouraged by a debilitating injury, comes back after being treated—smiling and grateful because he or she has returned to an active lifestyle,” says Dr. LaPrade. “Every time I see patients like that, I get choked up because we were able to help them.”

“It’s important for people to realize that we are not just treating athletes. But by treating them, we can help everyone a great deal as well.”

“Because of appreciative patients and generous supporters, we are able to continue to improve patients’ health, and we are extremely grateful for that. We don’t have a scarcity of ideas, and the generosity of our supporters allows us to continue to explore these problems and determine ways to help patients heal faster and return to active lives.”

DR. LAPRADE TO RECEIVE MAINE 2015 ALUMNI CAREER AWARD

Dr. Robert LaPrade has been named the 2015 recipient of the University of Maine Alumni Career Award. It is the most prestigious recognition given by the University of Maine Alumni Association, and is presented to a Maine graduate whose life’s work is marked by outstanding achievement and dedication. Previous recipients include former U.S. Senator Olympia Snowe, renowned cancer researcher Dr. Peter Brooks, Nobel Peace Prize winner Dr. Bernard Lown, and best-selling author Stephen King.



DEPARTMENT OF BIOMEDICAL ENGINEERING

The Department of BioMedical Engineering has a primary goal of helping The Steadman Clinic physicians improve their practice of orthopaedic sports medicine by conducting research that can be directly implemented to improve patient care. The Department's other goals are to educate the larger, national, and international network of physicians, patients, and scientists through high-quality journal publications and presentations of research, and community outreach programs.

Our multidisciplinary laboratory utilizes quantitative, analytical, and innovative methods to answer questions that arise from collaboration with world-renowned medical doctors, clinical care professionals, and educational programs.

The BioMedical Engineering team is composed of intelligent and collaborative individuals who share a strong passion for orthopaedic and sports medicine research and education. By promoting and sustaining a highly collaborative environment, both within and beyond our department and institute, we conduct research with direct and immediate application to orthopaedic care in order to ensure that patients receive evidence-based treatment proven to result in superior outcomes. By emphasizing bench-to-bedside research, we help active people from all walks of life and athletes—from elite competitors to weekend warriors—maintain and enhance their athletic performance, health, and quality of life.

METRICS OF SUCCESS

The Department of BioMedical Engineering uses four primary metrics to evaluate the success of research and education within the department: 1) awards that validate research excellence, impact, and overall contribution to the field of orthopaedic and sports medicine, 2) presentations given at both national and international conferences that attract diverse audiences of physicians and



(L TO R): MATT KHEIR, B.S.; ALEX BRADY, M.S.; MELANIE VENDERLEY; KIMI DAHL, M.S.; JACOB MIKULA, B.S.; DANIEL MARCHETTI, B.S.; BROCK SCHINDLER, B.S.; JASON SCHON, B.S.; ERIK SLETTE, B.S.; DAVID CIVITARESE, B.A.; CHARLIE LOCKWOOD, B.A.; TRAVIS TURNBULL, PH.D.

scientists, 3) publications in high-impact, peer-reviewed journals, and 4) community outreach programs that support advances in medicine through innovative teaching and mentorship.

ACCOMPLISHMENTS

The BioMedical Engineering team continued its focus toward orthopaedic research excellence and was rewarded with a major research award, gave 26 presentations at national and international conferences, produced a record-breaking 36 publications in peer-reviewed journals, and participated in numerous community outreach events. Furthermore, the department has also been awarded the 2015 ISAKOS Achilles Orthopaedic Sports Medicine Research Award. Details of each of these accomplishments are included below:

2014 AOSSM Excellence in Research Award

- Awarded to the best paper submitted

in any category to the Awards Committee with a primary author under the age of 40

- Award presented by The American Orthopaedic Society for Sports Medicine

26 podium/poster presentations

13 podium and 13 poster presentations at national and international academic conferences attended by a diverse audience of physicians and scientists

36 peer-reviewed journal publications

- Rate of three publications per month
- High-impact journals, including: *American Journal of Sports Medicine (AJSM)*; *Journal of Shoulder and Elbow Surgery*; *Journal of Biomechanics*; *Knee Surgery, Sports Traumatology, and Arthroscopy*; *Journal of Bone and Joint Surgery, American Volume*; *Medical Engineering and Physics*

18/36 publications in *AJSM* (#1 ranked orthopaedic sports medicine journal)

- Six of these articles were eventually printed (hard-copy) in a single issue (Jan. 2015) and represented 20 percent (1 per 5) of articles in that issue

Community outreach events

- The BME team participated in a variety of outreach events, including several school science fairs, school presentations, and tours of the SPRI research facilities, in addition to serving as leaders and mentors for the SPRI Education and Public Outreach Committee (EPOC) Science Club.

2015 ISAKOS Achilles Orthopaedic Sports Medicine Research Award

- Recognizes the most outstanding clinical or laboratory research in the field of sports medicine submitted to the biennial ISAKOS international congress
- Presented by the International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine

COLLABORATIVE INITIATIVES

The BioMedical Engineering department continues to actively maintain existing and pursue new opportunities for collaboration with local, national, and international academic and corporate institutions. In 2014, the department collaborated and received research support from five industry partners and worked cooperatively with The Steadman Clinic, Vail Valley Medical Center, Vail Mountain School, Vail Christian High School, Eagle County School District, Colorado State University, and the University of Oslo in Norway. Furthermore, the department hosted a group of surgeons and orthopaedic researchers from Trondheim, Norway, to initiate collaborative discussions of research interests and emerging international topics in the field of orthopaedic sports medicine.

PROJECTIONS

Looking ahead, the BioMedical Engineering department is eager to pursue unique and exciting research opportunities through an intra-institutional collaboration with all SPRI departments and the Center for Regenerative Sports Medicine. The field of regenerative medicine offers many opportunities for multidisciplinary collaboration, and the various SPRI departments are well-equipped to be mutually beneficial to the exploration of this developing field. Additionally, the department will achieve consistent, well-managed growth and high-quality output. Specifically, our focus will be to engage in state-of-the-art science and research initiatives that will ensure we conduct impactful research that will improve patient care.



DR. ROBERT LAPRADE AND ÖSSUR AMERICAS DEVELOP AN IMPROVED METHOD OF BRACING A KNEE LIGAMENT

Dr. Robert LaPrade, chief medical officer at SPRI, working with the support of Össur Americas, has developed an improved means to brace posterior cruciate ligament (PCL) tears.

The PCL is one of the four major ligaments of the knee and resists forces pushing the tibia—one of the two long bones in the leg—from the back.

Dr. LaPrade approached Össur Americas regarding the concept in 2010. At that time, the only available brace was one used after PCL reconstruction procedures. Dr. LaPrade proposed a study that would quantify the external forces applied to the tibia by both a static force brace and a dynamic force brace.

STATIC FORCE BRACE

A static force brace provides a constant force applied to the tibia for each level of the brace, and the force does not change throughout the range of motion that the brace allows. The effect is a force to counteract the posterior sag of the tibia. This “sag” can be identified by a physician or physical therapist when a patient is lying on his or her back with the affected knee joint raised and at a 90-degree angle. If the position of the joint is not properly controlled during rehabilitation, loads from the hamstring muscles cause the PCL to heal in an elongated position.

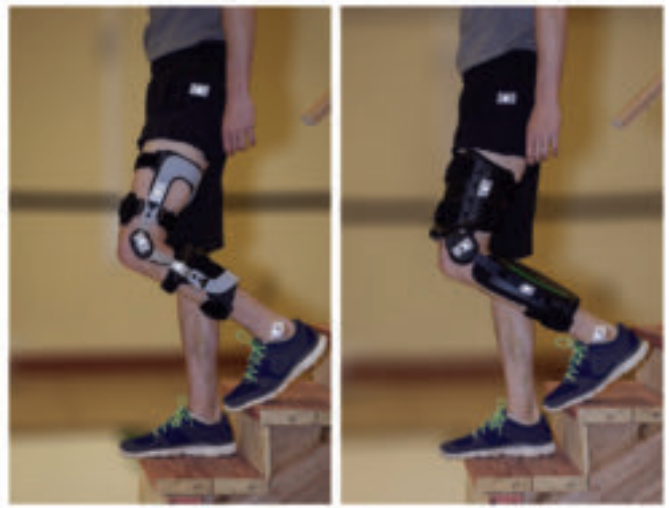
DYNAMIC FORCE BRACE

A dynamic force brace applies an anterior-directed force (a force from the front of the leg/joint) to the tibia that changes with the angle of the knee joint, but this type of brace has not been biomechanically or clinically validated.

Typical reasons for PCL bracing include the protection of a reconstructed PCL and to prevent a graft from becoming elongated. The brace can also assist in PCL healing in cases where surgery has not been performed, and it can provide external stability to a knee that is PCL-deficient. In the PCL-deficient knee, bracing can diminish the development or progression of osteoarthritis.

HYPOTHESIS CONFIRMED

The most important finding was that the force applied by the dynamic force brace changed as the angle of the joint changed, while the force applied by the static force brace remained the same. Also, forces applied by the dynamic brace were significantly larger than forces applied by the static force brace at higher flexion angles, at which the PCL load is greatest.



The results of this study confirmed Dr. LaPrade's hypothesis that forces applied by the dynamic brace would dynamically change as the leg's flexion angle changed, and forces applied by the static brace would remain constant. Dr. LaPrade concluded that:

- The dynamic force brace applied forces to the posterior proximal tibia that dynamically increased with increased flexion angle.
- The dynamic force brace applied significantly larger forces at higher flexion angles compared to the static force brace, where the PCL is known to experience larger forces.
- Clinical outcome studies are necessary to determine if the loading characteristics of the dynamic force brace result in long-term improved posterior (rear) knee laxity following PCL injury.

Dr. LaPrade also concluded that non-operative and post-operative management of PCL injuries should incorporate the use of a dynamic force brace that supplies a dynamic anterior (front) tibial force. This will protect the PCL by off-loading the forces that would have been applied to the healing PCL.

This study is an example of applied research conducted at SPRI and the partnership between Dr. LaPrade and Össur Americas that resulted in an improved means for bracing following a posterior cruciate ligament injury or PCL surgery.

Dr. LaPrade's study was published August 11, 2014, in *Knee Surgery, Sports Traumatology, Arthroscopy*.

Tears of the posterior cruciate ligament (PCL) can be disabling, especially during descent and deceleration activities, due to increased laxity in the rear area of the knee. Although favorable clinical outcomes have been reported for non-operative treatment of most isolated grade PCL injuries, increased rates of osteoarthritis have been associated with non-operative treatment of chronic injuries, and surgical intervention has been recommended for most combined ligament injuries.

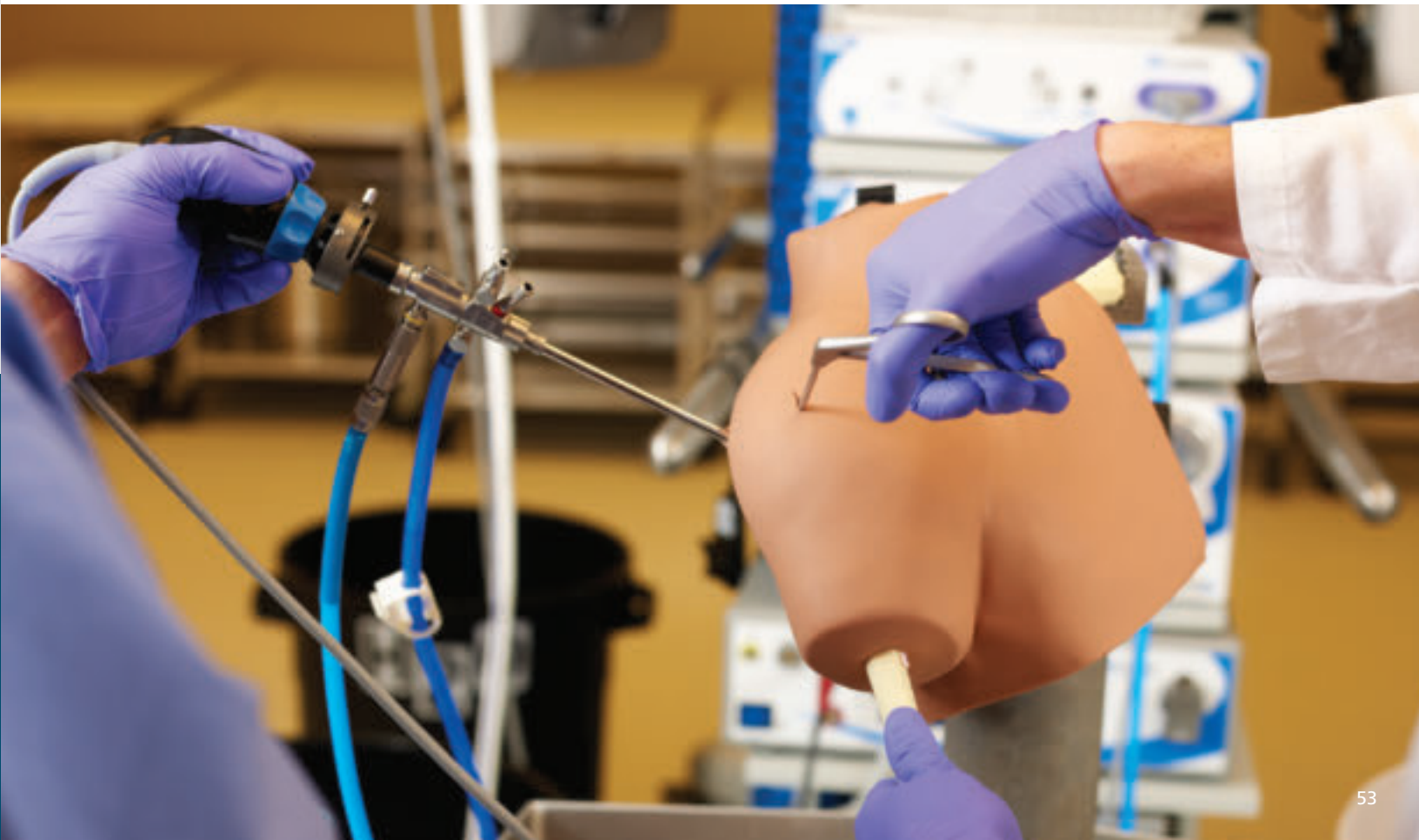
SURGICAL SKILLS LABORATORY

DAVID CIVITARESE, LAB COORDINATOR

Although the field of sports medicine requires physicians to master a variety of patient care skills, technical operating abilities are a crucial aspect of the patient experience. Just as professional athletes require hours of repetition to perfect their athletic techniques, orthopaedic surgeons cannot become leaders in their field without thousands of hours of simulated practice.

The Surgical Skills Lab provides surgeons and other sports medicine professionals with a realistic environment that closely replicates the operating room. Our industry-leading surgeons and facilities have attracted medical specialists from all over the world to train and advance their techniques through hands-on cadaveric specimen training. We're applying what we have learned through our innovative research projects by educating surgeons in these new techniques.

Year-to-date, we've hosted over 150 labs, which include 18 for various medical device companies and the remaining 132 for our M.D. fellows, A.T.C. fellows, and other internal staff. We can expect hundreds of surgeons to come through our lab annually, and as many as 100 surgeons in a weekend. We are confident that increased surgeon training, particularly as it relates to our current research concepts and techniques, correlates with improved outcomes for the patients in the operating room.



IMAGING RESEARCH

Imaging is a vital part of orthopaedic and sports medicine for diagnosis, treatment, and postoperative evaluation. Imaging Research develops and evaluates noninvasive imaging techniques of the joints for the purpose of directing and monitoring clinical treatment and outcomes.

Imaging Research also enhances the clinical relevance of research conducted in the Center for Outcomes-Based Orthopaedic Research, the Department of BioMedical Engineering, the Center for Translational and Regenerative Medicine Research, and looking forward, the Center for Regenerative Sports Medicine.

STAFF

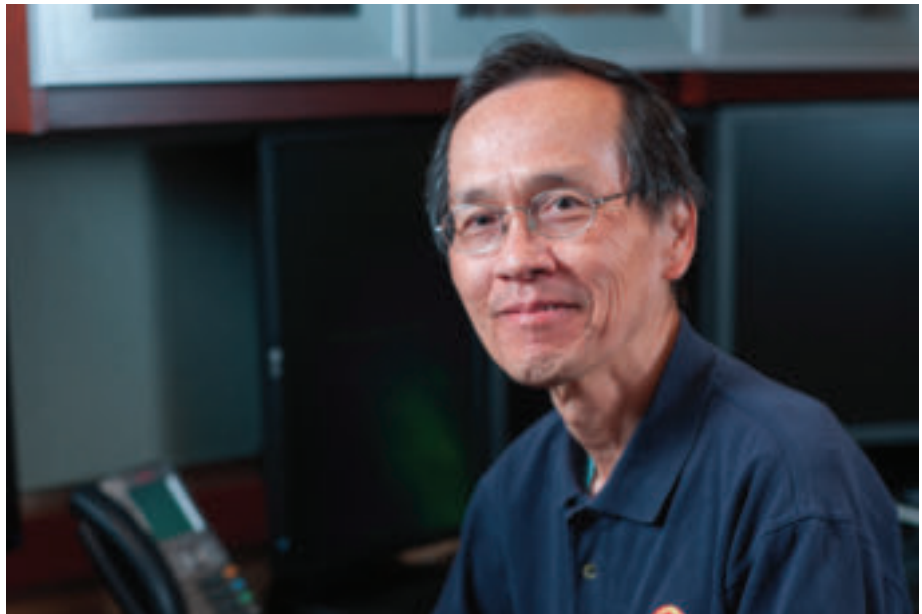
Dr. Charles Ho, who directs and supervises Imaging Research personnel and initiatives, is in his seventh year as director of Imaging Research. Dr. Ho has been a member of SPRI's Scientific Advisory Committee since 1994.

Carly Lockard, M.S., has joined the Imaging Research team as a research engineer. At the end of 2015, Rachel Surowiec, M.S., former senior research scientist, left SPRI to undertake her Ph.D. studies and is now in the doctoral program at the University of Michigan. Rachel and former research engineer Katharine Wilson, M.S., continue as consultants to assist in completing research projects begun at SPRI.

During 2014-2015, Elizabeth Carpenter, M.D., was the Griffin Visiting Scholar for Clinical Sports Medicine MRI, sponsored by the Griffin Foundation. Dr. Carpenter has joined a radiology practice in Denver, Colorado.

TECHNOLOGY

The SPRI database continues to grow. It now includes more than 12,000 MRI examinations and two million imaging-related data points. Included in the data are shoulder, hip, knee, and foot/ankle



CHARLES P. HO, PH.D., M.D.

images. An upgraded magnetic resonance imaging scanner is planned for October of 2015.

RESEARCH AND COLLABORATIVE INITIATIVES

Imaging Research continued its annual screening of 30-40 young skiers and hockey players to determine how best to prevent hip injuries and disorders. These injuries develop because the mechanics of skiing and skating can put significant stress on the hip joints and surrounding muscles.

By learning how a player's hips develop over time, the study will help identify at-risk activity and lead to early intervention and treatment to help prevent more serious long-term effects.

The process of quantifying imaging diagnoses of articular and soft tissues (volume and thickness) continued in 2014, and new initiatives were begun that involve the rotator cuff and rotator cuff

tears. Additional studies are being planned to investigate articular cartilage in the shoulder, as well as knee cartilage with knee injuries and ACL tears to determine what happens to cartilage tissue after injury over an extended period of time. Imaging Research collaborates with Siemens on quantitative magnetic imaging of articular cartilage of the knee and hip, and more recently, articular cartilage in the shoulder. Siemens provides support in the areas of technology and funding.

Imaging Research works with the University of Queensland and Commonwealth Scientific and Industrial Research Organization (CSIRO) in Australia on multiple research projects. They include studies of the knee and hip, and of structures such as the meniscus of the knee, labrum of the hip, and articular cartilage of both joints.

Collaboration between the two Australian organizations extends to methods of dividing regions and tissues of joints into

VISITING SCHOLARS FOR SPRI

THREE FORMER EUROPEAN VISITING SCHOLARS AT SPRI EARN PH.D. DEGREES

Three gifted orthopaedic surgeons from Europe who spent a year in the Steadman Philippon Research Institute Visiting Scholars Program have now earned Doctor of Philosophy degrees directly or indirectly related to their research at SPRI.

Dr. Ulrich Spiegl of Leipzig, Germany, Dr. Simon Euler of Innsbruck, Austria, and Dr. Olivier van der Meijden of Amsterdam, The Netherlands, worked with Dr. Peter Millett's team in The Steadman Clinic and with researchers at SPRI before returning to continue their studies or beginning orthopaedic sports medicine practices. Dr. Millett is director of the Visiting Research Scholars Shoulder Program.

The European Visiting Scholar Program is sponsored by Arthrex, an international medical device corporation, and is in its seventh year. The program provides support for young orthopaedic surgeons to spend a year in Vail observing and assisting physicians, conducting research, and contributing to articles that will be published in peer-reviewed journals. Each scholar spends approximately 40 percent of the time in clinical work and 60 percent dedicated to research.

DR. VAN DER MEIJDEN

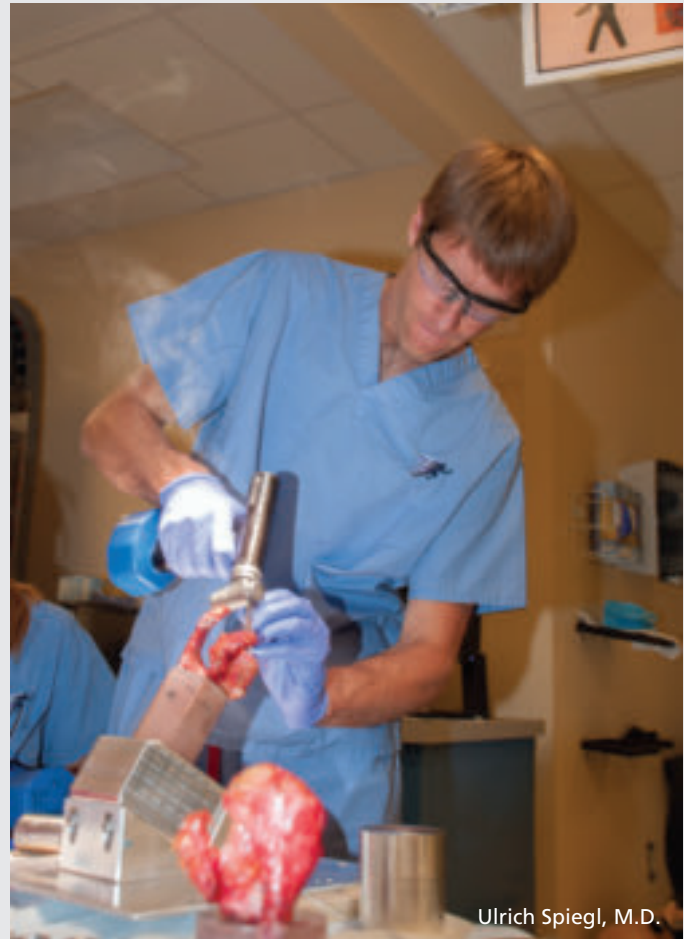
Dr. van der Meijden is a graduate of the University Medical Center in Wurzburg, Germany, and is now a resident in orthopaedic surgery at Vrije University Medical Center in Amsterdam.

"During my time at SPRI in 2010-2011, Dr. Millett and I collaborated on several literature reviews with Dutch colleagues on the surgical treatment of clavicle fractures," says Dr. van der Meijden. "These reviews formed the literature foundation of my thesis, and the Dutch colleagues became co-supervisors for my Ph.D."

DR. EULER

Dr. Euler graduated from the University of Erlangen-Nuremberg, Germany, and is now an attending physician in the Department of Trauma Surgery and Sports Traumatology at the Medical University of Innsbruck. He used two biomechanical studies and one clinical study during his stay at SPRI in 2013-2014 to complete his Ph.D. requirements.

"SPRI had a major impact on both research and clinical performance," he says. "I learned how to do research and enjoyed great support throughout the year. In addition to the research on which my Ph.D. was based, I benefitted a great deal by working clinically with Dr. Millett. I use those experiences and the knowledge I gained there in my everyday practice."



Ulrich Spiegl, M.D.

DR. SPIEGL

Dr. Spiegl, a visiting scholar in 2013-2014, graduated from Technical University of Munich. He is an attending physician and consultant at the University of Leipzig. The research initiatives on which he was involved at SPRI helped finalize his Ph.D. studies

"The opportunities I got through the Visiting Scholar Program at SPRI have already had an impact on my continuing studies and career," says Dr. Spiegl. "The experience broadened the horizon for me, gave me the chance to co-author several high-impact publications, and increased my network of professional colleagues."

SPRI AMBASSADORS

"All three visiting scholars have returned to their countries as ambassadors for the Steadman Philippon Research Institute and as emerging leaders in sports medicine," says Dr. Millett.

RACHEL SUROWIEC AND JOCELYN TODD AWARDED NATIONAL SCIENCE FOUNDATION RESEARCH FELLOWSHIPS

Two former Steadman Philippon Research Institute staff members, Rachel Surowiec and Jocelyn Todd, have been awarded prestigious National Science Foundation (NSF) Graduate Research Fellowships to pursue Ph.D. degrees.

SUROWIEC TO OAKLAND UNIVERSITY

Ms. Surowiec, who earned bachelor's and master's degrees from Ball State University, was a senior research scientist at SPRI in the Imaging Research Department. While at SPRI, she co-authored more than a dozen manuscripts published in peer-reviewed journals, including the *British Journal of Sports Medicine*; *Knee Surgery, Sports Traumatology, Arthroscopy*; and the *Journal of Magnetic Resonance Imaging*.

Ms. Surowiec is pursuing her Ph.D. at Oakland University in Rochester Hills, Michigan, and is the first NSF Fellowship in Physics recipient in the school's history. She will be conducting her dissertation research with Dr. Yang Xia, whose lab uses a variety of imaging methods to study the degradation of articular cartilage during osteoarthritis.

"SPRI has been pivotal to my growth as a researcher," says Surowiec. "It is where I developed a deep interest in non-invasive techniques to image articular cartilage. Without the experience I gained from Dr. Charles Ho, I could not have imagined realizing my dream of becoming a National Science Foundation Fellowship recipient."

"I left SPRI with unparalleled experience in research and had amazing opportunities to work with leaders in the field of imaging and orthopaedics," she adds. "I am so thankful for all of the experiences that SPRI provided."

TODD TO THE UNIVERSITY OF UTAH

Jocelyn Todd served as a summer undergraduate research fellow at SPRI in 2013 while working toward a B.S.E degree in biomedical engineering at the University of Iowa. At SPRI, she worked with a team on two projects related to surgical techniques on the shoulder.

The findings of both studies were published in leading orthopaedic journals—*The American Journal of Sports Medicine* and the *Journal for Shoulder and Elbow Surgery*.

"Because of my experience at SPRI, I decided to pursue further orthopaedic research through an honors thesis at the University



of Iowa Biomechanics Laboratory," says Ms. Todd. "In August, I will begin working toward my Ph.D. in bioengineering at the University of Utah, where I will focus on finite element modeling of cartilage defects in the hip."

"My internship at SPRI really developed my excitement for conducting research, and reinforced my interest in orthopaedics and biomechanics."

SPRI HONORED BY AWARDS

The NSF received more than 16,000 applications for the 2015 fellowship awards, and only 2,000 NSF awards were made. The fellowships provide three years of tuition and a stipend for graduate studies and open doors for further research collaboration, NSF internships, and international research experiences.

"We are honored to share this exciting news, and we congratulate Rachel and Jocelyn on their well-deserved and significant achievements," says Travis Turnbull, Ph.D., deputy director and senior engineer/scientist in the Department of BioMedical Engineering at SPRI.

EDUCATION



2014–2015 FELLOWS

This year, eight young orthopaedic surgeons were selected from a field of more than 160 to participate in 12 months of vigorous training in the Steadman Philippon Sports Medicine Fellowship Program. Our goal is to prepare them to be leaders in the field of orthopaedic sports medicine for the remainder of their careers. Many go on to hold high-level faculty positions at top medical schools.

In 2010, we added two fellows to our program when we welcomed the Institute's first Foot and Ankle Fellow and the world's first Sports Medicine Imaging Research Fellow, which is sponsored by Kenneth Griffin. In addition, we now have three visiting scholars, who are in essence research fellows from other countries. The 11 fellows and visiting scholars are being given a unique opportunity to perform research in their respective areas of interest, including biomechanics research, clinical research, imaging research, and basic science research.

Once every 18 months after that, they will return with other past fellows for further education and to exchange the knowledge they have gained since completion of fellowship training. The Institute currently maintains a network of more than 200 fellows in communities around the world who serve in academic positions at leading universities and in private practices.

2014–2015 STEADMAN PHILIPPON SPORTS MEDICINE FELLOWS

Sanjeev Bhatia, M.D.

Originally from Brookfield, Wisconsin, D. Bhatia graduated Phi Beta Kappa from the University of Wisconsin-Madison, where he spent a summer studying human rights at the London School of Economics. After college, he attended medical school at Northwestern University, where his growing interest in orthopaedic surgery led him to pursue a one-year orthopaedic sports medicine research externship.



FRONT L-R: JOHN FEAGIN, M.D.; TOM CLANTON, M.D.; J. RICHARD STEADMAN, M.D.; SANJEEV BHATIA, M.D.; PETER MILLETT, M.D., M.SC.; ROBERT LAPRADE, M.D., PH.D. **SECOND ROW:** JUSTIN NEWMAN, M.D.; M. BRETT RAYNOR, M.D.; WILLIAM MOOK, M.D.; MICHAEL WALSH, M.D. **BACK ROW:** TOM HACKETT, M.D.; BRENT WARNER, M.D.; SCOTT WHITLOW, M.D.; RANDY VIOLA, M.D.; MARC PHILIPPON, M.D.

Dr. Bhatia completed his residency at Rush University Medical Center in Chicago, Illinois. He participated in sports team coverage for several local college and professional teams, including DePaul men's and women's soccer, Chicago Force women's football, and Chicago Steel men's hockey. As a resident, he published studies on glenoid bone loss, ACL reconstruction, and bone-tendon healing. His research has received awards at the national level and has been presented internationally. As a chief resident, Dr. Bhatia was nominated co-editor of the "Grand Rounds: What's Your Diagnosis" monthly column in *Orthopaedics Today*. He is currently a scientific reviewer for the *American Journal of Sports Medicine*.

Dr. Bhatia enjoys downhill skiing, mountain biking, photography, and travelling. He moved to Vail with his wife, Avanti, a speech-language pathologist who worked with the Listen Foundation and Eagle County Schools.

William R. Mook, M.D.

Born and raised in Virginia, Dr. Mook completed his undergraduate education at Virginia Tech, where he graduated summa cum laude with a B.S. in human nutrition, foods, and exercise, with minors in biology and chemistry. As an undergraduate, he also completed an intramural research-training award fellowship in lipid biochemistry at the National Institutes of Health, in addition to completing additional course work in human anatomy at the Johns Hopkins School of Medicine.

Dr. Mook went on to receive his medical training at the University of Virginia, where he confirmed his interest in orthopaedics. He was elected a member of Alpha Omega Alpha and graduated with honors. Upon completing medical school, Will traveled to Duke University for his orthopaedic surgery training. During his time at Duke, he provided physician

coverage for most of Duke's varsity athletic teams, including the men's football, basketball, and lacrosse teams.

His research interests at Duke included multi-ligament knee injuries, athletic foot and ankle injuries, and periprosthetic shoulder infections. Prior to completing his training, he was chosen by his fellow residents for the John M. Harrelson Chief Resident Teaching Award in recognition of the chief resident who contributed the most to their education and training.

Will and his wife Emily were excited to be moving to Vail with their 15-month-old daughter, Reese. His interests outside of medicine include golfing, skiing, hiking, and staying active outdoors.

Justin T. Newman, M.D.

Dr. Newman grew up farming and ranching in Holyoke, Colorado. He then went to the University of Denver on a Boettcher Foundation Scholarship. While there, he spent a year abroad with one semester at the University of London and another at the Universidad Católica de Valparaíso, Chile. He then returned to managing his farming business for a year before starting medical school at the University of Chicago, Pritzker School of Medicine.

During medical school, he spent three months doing research in Peru, and he did a one-year orthopaedic and orthopaedic trauma research fellowship through Denver Health and the University of Colorado School of Medicine. He completed his orthopaedic residency at the University of Colorado.

Justin was joined in Vail part time by his family. His wife, Mandi Beman, M.D., continued her minimally-invasive gynecological surgery practice in Denver. She brought their two boys to Vail for part of the week.

M. Brett Raynor, M.D.

Dr. Raynor grew up in Dallas, Texas. He attended Duke University, where he majored in economics. He returned to

Texas to attend the University of Texas Southwestern Medical School and was inducted into the Alpha Omega Alpha Honor Medical Society.

Following medical school, Dr. Raynor completed his residency in orthopaedic surgery at Vanderbilt University Medical Center in Nashville. During his time at Vanderbilt, he served as team physician for high schools in the area and frequently lectured at the medical school as part of the physical diagnosis curriculum. During residency, his research focused on the use of the patient history in diagnosing shoulder disorders and on the epidemiology of shoulder instability.

Dr. Raynor moved to Vail with his wife, Liza, their two daughters, Hadleigh and Julia, and dog, Henry. Outside of work, Brett enjoys running, skiing, and fly-fishin

Michael P. Walsh, M.D.

Dr. Walsh graduated Phi Beta Kappa and summa cum laude with a biology and business management double major from Hamline University in St. Paul, Minnesota. While at Hamline, Dr. Walsh received eight athletic letters, playing both football and baseball. He also earned the Jerry Smith Award as the top senior athlete at Hamline.

Dr. Walsh then moved down the street for medical school at the University of Minnesota in Minneapolis, where he found interest in orthopaedic surgery. Following medical school, Dr. Walsh traveled to Ann Arbor for orthopaedic surgery residency at the University of Michigan. While at the U of M, Dr. Walsh had the pleasure of covering the University of Michigan football and hockey teams, in addition to Eastern Michigan football and basketball in Ypsilanti, Michigan. He also served as team physician for two local high school football teams.

Dr. Walsh moved to Vail with his wife, Angela, a middle school teacher, who spent her year substituting. Dr. Walsh's interests outside of medicine include fishing, hunting, golfing, and skiing

Brent T. Warner, M.D.

Born and raised in Ohio, Dr. Warner attended Duke University where he was an NCAA All-American pole vaulter and graduated summa cum laude with a degree in biomedical engineering. He then returned to Ohio to obtain his medical degree from The Ohio State University, graduating magna cum laude and as a member of the Alpha Omega Alpha Honor Medical Society.

Following medical school, Dr. Warner completed residency training at the University of North Carolina at Chapel Hill. As a resident, he was selected for the American Orthopaedic Association Emerging Leaders Forum, participated in several research projects, and was published in *Arthroscopy*. He also provided physician coverage for the University of North Carolina football and women's soccer teams, the Carolina Railhawks, and North Carolina high school football teams.

In his free time, Dr. Warner enjoys outdoor activities, including long-distance running, cycling, skiing, and snowboarding. His wife, Kristie, daughter, Kate, and furry companion, Magill, joined him for the year-long adventure in the Vail Valley.

FOOT AND ANKLE FELLOW

Scott R. Whitlow, M.D.

Dr. Whitlow was born and raised in Seattle, where he grew up on skis and rooting for Seattle sports. Seeking a change of scenery before returning to the West Coast, he attended Colby College in Waterville, Maine. He was interested in sciences and research, and after graduating with a B.A. in biochemistry, he moved to Boston to work in basic science research. He has multiple publications in the field of immunology resulting from his research at Harvard Medical School.

Deciding he wanted the interpersonal relationships medicine had to offer, Dr. Whitlow attended Boston University School of Medicine, spending one summer working in clinics and operating rooms

in Quito, Ecuador. After an initial interest in general surgery trauma, a week in orthopaedic surgery the summer before his fourth year changed his mind. He completed residency at UC Davis in Sacramento, where he particularly enjoyed trauma, sports, and foot and ankle surgery.

Outside of work, Scott spends time skiing, mountain and road biking, hiking, paddling, and playing golf. He moved here with his dog Jack, who enjoys swimming, chasing tennis balls, and being pet by anyone and everyone.

GRIFFIN VISITING SCHOLAR FOR CLINICAL SPORTS MEDICINE MRI

Elizabeth L. Carpenter, M.D.

Dr. Carpenter grew up in New York along the shores of Long Island and Fire Island, where she learned to sail, fish, and enjoy everything that the outdoors has to offer. She attended college in North Carolina at Wake Forest University, where

she graduated cum laude with special honors in biology. During this time, she also studied abroad in Europe, where she focused on marine biology and the arts. She subsequently pursued medical school at Stony Brook University in Stony Brook, NY.

Following medical school, Dr. Carpenter completed a surgically based internship in Cooperstown, N.Y., followed by diagnostic radiology residency at New York University, where she also served as chief resident. Upon completion of her residency, Dr. Carpenter completed a one-year fellowship specializing in musculoskeletal radiology and interventional procedures, also at New York University. Her primary interests include sports medicine and image-guided procedures.

Outside of medicine, Dr. Carpenter enjoys running, cycling, and tennis, and has recently started competing in triathlons. She was thrilled to return to the slopes of Vail, where she originally learned to ski.

WHERE ARE THEY NOW?

The graduating class of 2013–2014 Steadman Philippon fellows is busy establishing new careers in orthopaedics.

ANTHONY CERMINARA, M.D.

Dr. Cerminara has joined the practice at South Florida Orthopedics and Sports Medicine in Stuart, Florida.

MICHAEL B. ELLMAN, M.D.

Dr. Ellman has established his practice at Panorama Orthopedics and Spine Center in Golden, Colorado.

JEFFREY R. JAGLOWSKI, M.D.

Dr. Jaglowski has moved to Houston, Texas, and joined the All American Orthopedic and Sports Medicine Institute.

JARED JOHNSON, M.D.

Dr. Johnson is practicing at the Intermountain Orthopedic Clinic in Boise, Idaho.

COLEY GATLIN, M.D.

Dr. Gatlin has moved back to Texas and has established his practice at the College Station Hospital in College Station.

MARK HAMMING, M.D.

Dr. Hamming is establishing his practice at the Illinois Bone and Joint, Lake Forest, Illinois.

C. THOMAS HAYTMANEK, JR, M.D.

Dr. Haytmanek is practicing at the Coughlin Foot and Ankle Center in Boise, Idaho.

GREGORY A. SAWYER, M.D.

Dr. Sawyer has moved to the East Coast and is practicing with Maine Medical Partners in Falmouth, Massachusetts.

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 2014–2015 Steadman Philippon fellowship class are **Mr. and Mrs. Lawrence Flinn, Mr. and Mrs. Peter Kellogg, Mr. and Mrs. Al Perkins, and Mr. and Mrs. Steven Read.**

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

DR. SANJEEV BHATIA: SOLID FOUNDATION LEADS TO CAREER ACHIEVEMENTS AND STEADMAN PHILIPPON FELLOWSHIP

By Jim Brown

The building blocks that led to Dr. Sanjeev Bhatia's success as an orthopaedic surgeon and an appointment as a Steadman Philippon Fellow began to take shape very early in his life.

Dr. Bhatia's father is a mechanical engineer, his mother is a family medicine physician, and his sister is a radiation oncologist.

"It was a pretty math/science heavy family," says Dr. Bhatia. "I got to see the value of helping people and how gratifying it is, and also observed attributes involved in being a good doctor. My family was very supportive of my interest in medicine and surgery."

The second building block was his interest in sports. "I've always been interested in sports. In my teens, I was a long jumper and triple jumper, and a centerfielder in baseball. Those experiences, plus the recreational sports I enjoyed, are at least partially responsible for attracting me to this field.

His interest in medicine continued to develop in high school because of sports injuries he sustained. He was curious about how structural problems of the musculoskeletal system translate into functional problems that result in diminished athletic performance. [What teenage high school student isn't?]

EXPANDING HIS UNIVERSE

A summer program at Brown University in Rhode Island required a research project. "Mine was anterior cruciate ligament reconstruction. I started reading about techniques for reconstruction and remember thinking this was about the coolest thing in the world."

At the University of Wisconsin-Madison, he graduated Phi Beta Kappa with a major in biology and minor in business. Between college and medical school, he enrolled in the London School of Economics for a course on theory and practice of human rights. "I wanted to see different aspects of human rights and interact with talented people not in my field," he explains

Dr. Bhatia attended medical school at Northwestern University and was particularly attracted to the study of anatomy and different aspects of the musculoskeletal system. He completed his residency



Sanjeev Bhatia, M.D.

at Rush University Medical Center in Chicago. As chief resident, he was co-editor of a monthly column in *Orthopaedics Today*. Now he is a scientific reviewer for *The American Journal of Sports Medicine*.

Clearly on a career path that centered on musculoskeletal conditions, he moved closer to becoming a surgeon. "The gratifying thing about surgery is being able to help improve someone's life very quickly and in a fixed amount of time. That's very different from other fields of medicine. Being a surgeon seemed to be a perfect blend of my interest in the musculoskeletal system, surgery, and desire to help people."

GIANTS OF MEDICINE

Dr. Bhatia first became aware of The Steadman Clinic from watching ESPN. "I noticed the number of elite athletes who received high level treatment there and later became more aware of a very unique health care clinic and research institute. On a ski trip to Vail, I saw The Clinic and SPRI for the first time and got a sense of the mystique surrounding both."

"I met doctors who had done their fellowships at SPRI and saw how impressive they were. I've always admired leaders like Dr. Steadman and Dr. Philippon for the things they brought to the field of orthopaedic sports medicine. Later, I learned that the faculty included Dr. Millett, Dr. Hackett, Dr. LaPrade, and Dr. Clanton, as well as other physicians and scientists. Having all of these giants of medicine in one location made me realize that I couldn't find a better place to train.

MENTORSHIPS

"Once I got here, the thing that impressed me immediately was how welcoming and friendly the faculty and staff are," says Dr. Bhatia. "I've had a lot of great mentors, but being able to work with and get to know these high-profile members of the orthopaedic community on a personal level is something I never expected. They have really helped me, and their mentorship is something I will draw on for the rest of my career."

THE MACHINE SHOP

"Another first impression was a tour of the Department of BioMedical Engineering. Travis Turnbull showed me around, and one of the most interesting areas I saw was the machine shop. Dr. Turnbull is a mechanical engineer with a passion for orthopaedic research. When someone has an idea, he is able to design and fabricate an instrument to allow testing right here."

"Other fellowship programs don't have that, and it's just one of the reasons why so much high-impact research comes out of SPRI. The Institute has the ability to adapt and be nimble. It's another reason for SPRI's success."

THE STEADMAN PHILIPPON CULTURE

Dr. Bhatia has also observed a level of service in the doctor-patient relationship that Dr. Steadman instilled as a culture more than two decades ago.

"Every patient who comes to The Clinic becomes part of the Steadman Philippon family. It's apparent the first time you meet them, and it continues after they leave. The doctors here spend lots of time with each patient, answer any question, and are on call at all hours of the day and night. This kind of interaction improves outcomes by involving patients in the decision making process."

PRESENTATIONS, PUBLICATIONS

Dr. Bhatia and his cohorts benefit from the opportunities to present SPRI research and have it published in the world's leading professional journals. He will have had 10-15 national and international presentations and publications during his year in Vail. His main study focuses on meniscal preservation and aims to develop a new way to repair radial meniscus tears, a commonly seen tear type that was previously deemed irreparable.

JOINT PRESERVATION

"The most satisfying aspect of my time here has been learning more about the emphasis on joint preservation," says Dr. Bhatia. "The goal 15-20 years ago in orthopaedics was to relieve pain. Patients, especially those in the 20- to 40-year-old age group who had debilitating joint conditions, were either written off by other doctors, had to live with their damaged joints, or had total joint replacement at an early age. Now we know that there are interventions that can preserve joints instead of replacing them."

NEW FRONTIERS

Dr. Bhatia will be in Vail long enough to benefit from the development of SPRI's new Center for Regenerative Sports Medicine. "SPRI is on the verge of cutting edge changes that have the potential to change the face of how orthopaedic health care is delivered."

In Dr. Bhatia's next position, he will direct a new joint preservation initiative at the Cincinnati Sports Medicine & Orthopaedic Center. He and his wife, Avanti, who is a speech-language pathologist, will move to Ohio in August.

He thanks SPRI's supporters for their contributions. "Their generosity has been an instrumental part in making this the most amazing and outstanding year of my training."

GROWING THE NEXT GENERATION OF SCIENCE STARS

By Randy Wyrick



Photo Credit, Randy Wyrick

The Steadman Philippon Research Institute attracts physicians and scientists from all around the world. Now, SPRI is growing their own.

The Institute's Education and Public Outreach Committee — EPOC, chaired by Senenne Philippon — began a program to inspire elementary, middle, and high school students to become more involved in science, technology, engineering, and mathematics.

Four teams of local high school students — SPRI's Science Club — spent a school year, 2014-2015, doing research, working with mentor scientists and preparing presentations.

BACKPACKS AND BACKS

Battle Mountain's Christian Apps and Natalie Arroyo were up first. Apps had been to SPRI on several occasions, usually as a patient, and gave a shout out to Dr. Hackett, who has repeatedly put his shoulder back together.

Skiing is 5,000 years old, but some of the questions are new, such as:

"Can wearing a backpack while skiing or snowboarding change your balance and cause injuries?"

One of their teachers hurt himself skiing and blamed his backpack. They set about seeing if he was right.

There is a correlation, they learned, but that doesn't mean the backpack caused it. It also depends on what you were doing and where you were doing it.

As part of their research, they used the Wii Fit balance board on a simulated ski race course, which was entertaining because they got to watch 24 classmates crash and burn wearing backpacks and not wearing backpacks.

Nobody said research isn't fun.

They discovered two things: 1) Their backpack times were generally slower. 2) There's a higher correlation of injury.

FEMUR FAILURES

Vail Christian's Johnny Barron and Rachel Keith studied stress fractures in the proximal femur.

It happens more often than you think, and can end badly.

Bo Jackson, for example, started with a stress fracture. It ended in disaster, as these cases sometimes do.

Keith is a dancer and said hip problems are common. Barron's mother was a dancer in China when she was a child, and now she has hip problems.

"This was a very personal experiment for me," Barron said.

Keith and Barron focused on long distance runners because they tend to overuse everything.

"Runners are stubborn people and will keep running even when they're injured," Barron said.

There's a proper running form and doing it badly — especially on hard surfaces — will cause injuries. Refusing to deal with an injury will make that injury worse, they found.

"We live in an active valley, and when people get hurt they go back to their activity too quickly," Barron said.

The first treatment is rest. "Rest isn't what people want to do," Barron said.

"Walk or jog lightly. Better yet, do aqua therapy. That's a great way for people to rehabilitate," Keith said.

For you "Old Schoolers," you can tape it, but you still have to give yourself time to heal. Painkillers are OK, but don't overdo it.

"When your body is telling you it's hurt, believe it," Barron said.

Dr. Marc Philippon, one of the world's foremost hip surgeons, walked into the room during the presentations.

"Nutrition also plays a role," he said. "They think the lighter they are, the faster they'll run. Not necessarily."

Dr. John Feagin worked with the military for years, where he said malnutrition kept rearing its head.

"The cost to the military of a stress fracture is huge. It frightened the military into changing what it was doing, and allowing injuries, especially stress fractures to heal," Dr. Feagin said. "How long it takes to heal – rest – depends on how hurt you are, and whether you've done this before. Generally speaking, you're looking at a couple months."

Some of their research suggested biking, but more suggested aqua therapy.

CURING SHIN SPLINTS

Vail Mountain School's Dylan Cunningham and Oliver Presso came up with a gadget to deal with medial tibial stress syndrome — shin splints. It's an overuse injury, and it's painful and frustrating.

You get shin splints from repetitive activity on hard surfaces, such as running on a road or track.

One study tested 230 high school runners over three years; 102 got them, and 16 got them more than once.

Another study followed 124 Naval recruits, and they all suffered shin splints — 84 men and 40 women. There are lots of treatments. You can do tape and ice yourself, so that's where Presso and Cunningham focused.

There are a couple ways to tape it. Arch supports and orthotics also help, as do calf or shin supports.

Still, neither gave them what they wanted, so they invented their own gadget, the Dyliver Sleeve.

They started with all sorts of ideas, and simplified it to an orthopedic sock with a couple Velcro sleeves.

"People don't want to stop running, and could possibly continue with this device, Cunningham said. "The goal is to allow them to recover while they're still working."

BEATING BACK PAIN

Paula Cooper attends Vail Ski and Snowboard Academy, where she's a halfpipe skier.

She concentrated on back pain prevention in competitive skiers, because she's a competitive skier who has it, and so do most of her friends. Hers started in middle school.

Her two older sisters were ski racers, and have back pain.

"Most VSSA competitors end up with some level of it," she said.

There wasn't a lot of research because elite competitive is such a small world, she said. Of her fellow VSSA students, about a quarter miss training because of back pain, and most end up in physical therapy. The problems stem from doing exercises incorrectly, or overwork, she said.

"Part of it is doing your exercises properly," she said.

Cooper developed her "Around the World" exercise plan. It takes two or three minutes a couple times a day, and helps eliminate back pain and improve strength.

ABOUT EPOC

The three-tiered program has been developed in partnership with the Eagle County School District, Vail Mountain School, and Vail Christian Academy.

During the school year, four high schools, three middle schools, and four elementary schools participated in various EPOC programs.

Participating high school students commit to a minimum of two hours per week to their science projects, and SPRI research scientists are available throughout the year to mentor the students. The student teams are required to develop research timelines, submit progress reports and make a final report or presentation. Throughout the year, Science Club members get to attend SPRI research lectures.

Three SPRI laboratory tour days are set aside each year, and as many as 80 fifth-graders participate in the tours in a single day, said Megan Bryant, marketing coordinator for The Steadman Clinic.

"Having world-class research scientists as a sounding board really gives the students a sense of validation and pride," said Gabe Scherzer, a Vail Mountain School science teacher.

PARTNERS IN KIDS' EDUCATION

Jason E. Glass, Ph.D., Superintendent, Eagle County Schools

An important part of Eagle County Schools' strategic plan is the expansion of what we call experiential learning opportunities. This might sound like another education buzzword, but it really means our students getting out in the community and learning from and with the abundance of expertise and talent we have living and working in Eagle County.

Our schools just don't send kids out anywhere — the quality of the experience matters. Successful experiential learning involves making sure that students get to work with qualified and high caliber individuals, that there is a solid plan for what the student will do and learn, and that we can see and measure outcomes from these experiences.

Eagle County Schools' partnership with the Steadman Philippon Research Institute is a shining example of how our schools and experts in our community are working together to create a world-class learning experience for our students.

Depending on their age, Eagle County students get the chance to tour working medical laboratories, have distinguished scientists come to their school to visit classes and mentor science fairs, and complete hands-on projects related to science and technology. Our high school students even get to conduct original research with the support and guidance of one of Steadman Philippon's top-notch medical scientists. During the 2013-14 academic year, more than 500 Eagle County students were directly involved.

Beyond a textbook or a classroom discussion, students get to see and experience the scientific method in action — learning

the importance of research design and how to critically evaluate evidence to prove (or disprove) a claim.

Beyond just the science aspect (which is incredibly important in its own right), students learn from renowned scientists how to professionally present information, answer tough questions, and think deeply about how to back up their claims with more than just rhetoric or opinion.

As we envision the world Eagle County's children will grow into, the competencies learned through this partnership between Eagle County Schools and the Steadman Philippon Research Institute become even more important. Creativity, collaboration, critical thinking, presentation, and professionalism — these are all concepts our students get to experience first-hand

This community offers so much to students and families in terms of quality of life, but we must recognize that Eagle County is also a place where stellar scientists, physicians, artists and professionals of all kinds choose to make their home.

Our schools are capitalizing on this talent in the community and leveraging it into learning experiences that are nearly unmatched anywhere else in the country, if not the world. Eagle County Schools and the Steadman Philippon Research Institute are proud of our partnership, but we are even more proud of the future scientists, physicians, and professionals that we are growing right here in our own community.



A collection of various surgical instruments, including forceps, scalpels, and retractors, arranged on a green background. The instruments are rendered in a light green, semi-transparent style, creating a layered effect. The text 'PUBLICATIONS AND PRESENTATIONS' is overlaid in large, bold, white capital letters on the right side of the image.

PUBLICATIONS AND PRESENTATIONS

PUBLICATIONS & PRESENTATIONS

In 2014, principal investigators and fellows published papers in scientific and medical journals and delivered presentations to a variety of professional and lay audiences worldwide.

2014 PUBLICATIONS

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2014 PRESENTATIONS

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Briggs KK, Ho CP, Matheny LM, James EW, Steadman JR. 3.0 Tesla Magnetic Resonance Imaging for Detection of Trochlear Groove Cartilage Defects. Podium. *European Federation of National Associations of Orthopaedics and Traumatology (EFORT) Congress*, London, England, June 2014.

Briggs KK, Matheny LM, Rodkey WG, Steadman JR. Factors Associated with Complex Meniscus Tears Requiring Suture Repair. Poster (Selected for International Guided Poster Tour). *American Academy of Orthopaedic Surgeons (AAOS)*, New Orleans, LA, March 2014.

Briggs KK, Matheny LM, Rodkey WG, Steadman JR. Factors Associated with Complex Meniscus Tears Requiring Suture Repair. Poster. *European Society of Sports Traumatology, Knee Surgery and Arthroscopy (ESSKA)*, Amsterdam, The Netherlands, May 2014.

Briggs KK, Steadman JR, Rodkey WG.

Patellofemoral Cartilage Damage: Patients With Grade 4 Chondral Defects of the Patella Have Increased Disability. Podium. *ESSKA*, Amsterdam, The Netherlands, May 2014.

Briggs KK, Abrams R, Steadman JR. Patient-Centered Outcomes 10 Years Following ACL Reconstruction. Podium. *Arthroscopy Association of North America (AANA)*, Hollywood, FL, May 2014.

Briggs KK, Steadman JR. Patient-Centered Outcomes 10 Years Following ACL Reconstruction. Podium. *EFORT Congress*, London, England, June 2014.

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Clanton TO. Acute Lateral Tears: When Do You Treat and What Are the Options. *AAOS–American Orthopaedic Foot and Ankle Society (AOFAS) Specialty Day*, New Orleans, LA, March 2014.

Clanton TO. Acute Syndesmosis Injuries in the Athlete. *International Forum on Orthopaedic Sports Medicine & Arthroscopic Surgery (IFOSMA)*, Shanghai, China, May 2014.

Clanton TO. Ankle Fracture Management in Competitive Athletes & Others. *AAOS*, New Orleans, LA, March 2014.

Clanton TO. Ankle Fracture Management in Competitive Athletes & Others. *IFOSMA*, Shanghai, China, May 2014.

Clanton TO. Beyond the Basics: The Lateral Collateral Ligaments of the Ankle. *AAOS*, New Orleans, LA, March 2014.

Clanton TO. Blue Group–Tips/Peals/Mistakes Panel. *AAOS / AOFAS Total Ankle Arthroplasty*, Rosemont, IL, February 2014.

Clanton TO. Blue Group Video Demonstration. Video Demonstration. *AAOS / AOFAS Total Ankle Arthroplasty*, Rosemont, IL, February 2014.

Clanton TO. Cadaver Implant Session 1. Surgical Skills Lab. *AAOS / AOFAS Total Ankle Arthroplasty*, Rosemont, IL, February 2014.

Clanton TO. Cadaver Implant Session 2. Surgical Skills Lab. *AAOS / AOFAS Total Ankle Arthroplasty*, Rosemont, IL, February 2014.

Clanton TO. Cadaver Implant Session 3. Surgical Skills Lab. *AAOS / AOFAS Total Ankle Arthroplasty*, Rosemont, IL, February 2014.

Clanton TO. Cadaver Implant Session 4. Surgical Skills Lab. *AAOS / AOFAS Total Ankle Arthroplasty*, Rosemont, IL, February 2014.

Clanton TO. Green Group–Tips/Peals/Mistakes Panel. *AAOS / AOFAS Total Ankle Arthroplasty*, Rosemont, IL, February 2014.

Clanton TO. Green Group Video Demonstration. Video Demonstration. *AAOS / AOFAS Total Ankle Arthroplasty*, Rosemont, IL, February 2014.

Clanton TO. Injuries in Runners. *IFOSMA*, Shanghai, China, May 2014.

Clanton TO. Injuries to the Lateral Ankle Ligaments and Chronic Instability. *Grand Rounds, The Steadman Clinic*, Vail, CO, April 2014.

Clanton TO. Injuries to the Lateral Ankle Ligaments and Chronic Instability. *IFOSMA*, Shanghai, China, May 2014.

Clanton TO. Management of Syndesmosis Injuries in the Athlete. *AAOS*, New Orleans, LA, March 2014.

Clanton TO. Panel Discussion, Cases and Questions. *AAOS / AOFAS Total Ankle Arthroplasty*, Rosemont, IL, February 2014.

Clanton TO. Persistent Pain Following Total Ankle Arthroplasty: Why Might It Occur? *AAOS / AOFAS Total Ankle Arthroplasty*, Rosemont, IL, February 2014.

Clanton TO. Red Group–Tips/Peals/Mistakes Panel. *AAOS / AOFAS Total Ankle Arthroplasty*, Rosemont, IL, February 2014.

Clanton TO. Red Group Video Demonstration. Video Demonstration. *AAOS / AOFAS Total Ankle Arthroplasty*, Rosemont, IL, February 2014.

Clanton TO. Sports Surgery Research. *Triennial Conference of the Royal College of Physicians and Surgeons of Glasgow–Advancing Excellence in Healthcare 2014*, Glasgow, Scotland, June 2014.

Clanton TO. The Steadman Clinic & Steadman Philippon Research Institute. Plenary Speaker. *Triennial Conference of the Royal College of Physicians and Surgeons of Glasgow–Advancing Excellence in Healthcare 2014*, Glasgow, Scotland, June 2014.

Clanton TO. Yellow Group–Tips/Peals/Mistakes Panel. *AAOS / AOFAS Total Ankle Arthroplasty*, Rosemont, IL, February 2014.

Clanton TO. Yellow Group Video Demonstration. Video Demonstration. *AAOS / AOFAS Total Ankle Arthroplasty*, Rosemont, IL, February 2014.

Clanton TO, Campbell KJ, Wilson K, Michalski MP, Goldsmith MT, Wijdicks CA, LaPrade RF. A Qualitative & Quantitative Anatomic Study of the Lateral Ankle Ligaments for Repair and Reconstruction Procedures Poster. *AAOS*, New Orleans, LA, March 2014.

Clanton TO, Viens NA, Campbell KJ, LaPrade RF, Wijdicks CA. Biomechanical Comparison of Anterior Talofibular Ligament Allograft Reconstruction to the Intact Ligament. *AAOS*, New Orleans, LA, March 2014.

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Clanton TO, Abrams RF, Matheny LM. Outcomes Following Syndesmotic Injuries Treated With Suture-Button Fixation. ePoster. *AANA*, Hollywood, FL, May 2014.

Faucett SC, Briggs KK, Philippon MJ. Predictors of Traction Time During Hip Arthroscopy. ePoster. *ISHA*, Rio de Janeiro, Brazil, October 2014.

Ferro FP, Briggs KK, Philippon MJ. Arthroscopy Provides Symptom Relief and Good Functional Outcomes in Patients With Primary Synovial Chondromatosis of the Hip. *AANA*, Hollywood, FL, May 2014.

Ferro FP, Philippon MJ, Briggs KK. Clinical Outcomes After Hip Arthroscopy for FAI Are Equivalent Among Patients With Normal, High and Low Femoral Version. Podium. *ISHA*, Rio de Janeiro, Brazil, October 2014.

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Ferro FP, Philippon MJ, Briggs KK. Relationship Between Femoral Anteversion and Outcomes After Hip Arthroscopy for FAI. Podium. *AANA*, Hollywood, FL, May 2014.

Ferro FP, Philippon MJ, Rasmussen MT, Smith SD, LaPrade RF, Wijdicks C. Tensile Properties of the Human Acetabular Labrum and Hip Labral Reconstruction Grafts. Podium. *ISHA*, Rio de Janeiro, Brazil, October 2014.

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Haytmanek CT, Williams BT, James EW, Wijdicks CA, LaPrade RF, Clanton TO. Radiographic Landmarks of the Lateral Ankle Structures for Ligament Reconstruction. *International Federation of Foot & Ankle Societies (IFFAS) and AOFAS Combined Meeting*, Chicago, IL, September 2014.

Ho CP. Experiences in Sports Medicine MRI. *World Veterinary Orthopaedic Congress. Veterinary Orthopedic Society and European Society of Veterinary Orthopaedics and Traumatology*, Breckenridge, CO, March 2014.

Ho CP. Imaging and Imaging Biomarkers of Cartilage Health. *World Veterinary Orthopaedic Congress. Veterinary Orthopedic Society and European Society of Veterinary Orthopaedics and Traumatology*, Breckenridge, CO, March 2014.

Ho CP, Matheny LM, James EW, Crespo B, LaPrade RF. 3.0 Tesla Magnetic Resonance Imaging for Detection of Meniscus Root Tears. *AANA*, Hollywood, FL, May 2014.

Ho CP, Matheny LM, James EW, Briggs KK, Steadman JR. 3.0 Tesla Magnetic Resonance Imaging for Detection of Trochlear Groove Cartilage Defects. ePoster. *AANA*, Hollywood, FL, May 2014.

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Ho CP, Matheny LM, James E, Briggs KK, Steadman JR. 3.0 Tesla MRI for Detection of Trochlear Groove Cartilage Defects. Poster. *AANA*, Hollywood, FL, May 2014.

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Ho CP, Warth RJ, Bower G, Briggs KK, Hackett TR, Clanton TO. High Prevalence of Osteochondral and Soft-Tissue Damage in the Ankles of Asymptomatic Professional Snowboarders: A Prospective Evaluation With 3T MRI. Poster. *International Olympic Committee Conference on Prevention of Injury and Illness in Sport*, April 2014.

Ho CP, Warth RJ, Bower G, Briggs KK, Hackett TR, Clanton TO. High Prevalence of Osteochondral and Soft-Tissue Damage in the Ankles of Asymptomatic Professional Snowboarders: A Prospective Evaluation With 3T MRI. Poster. *ESSKA*, Amsterdam, The Netherlands, May 2014.

Ho CP, Williams B, Surowiec R, Dornan G, Gatlin C, LaPrade RF. MRI Characterization of Arthroscopically Verified ICRS Cartilage Defects Compared to Age Matched Asymptomatic Controls: Evaluation of Quantitative T2 Mapping in Clinically Relevant Subregions of the Knee. *ESSKA*, Amsterdam, The Netherlands, May 2014.

Ho CP, Philippon MJ, Briggs K, Ommen ND, Goljan P. Specificity and Sensitivity of 3T MRI in Diagnosing Grade 3 and 4 Chondral Lesions in the Hip. Feature Poster (Top 10 Posters). *AANA*, Hollywood, FL, May 2014.

Ho CP, Philippon MJ, Briggs K, Ommen ND, Goljan P. Specificity and Sensitivity of 3T MRI in Diagnosing Grade 3 and 4 Chondral Lesions in the Hip. *ESSKA*, Amsterdam, The Netherlands, May 2014.

Ho CP, Briggs KK, Goljan P, Fagrellius T, Philippon MJ. *World Congress of Cartilage Repair Society (ICRS)*, Zurich, Switzerland, July 2014.

Kennedy NI, Goldsmith MT, Faucett SC, Rasmussen MT, Coatney GA, Engebretsen L, Wijdicks CA. Posterior Cruciate Ligament Graft Fixation Angles: Biomechanical Evaluation for Single- and Double-Bundle Reconstruction. *AOSSM*, Seattle, WA, July 2014.

LaPrade CM, Watson JN, Wilson KJ, Kennedy NI, Campbell KJ, Hutchinson MR, Wijdicks CA, LaPrade RF. Iatrogenic Overlap of the Anterior Meniscal Root Attachments Following Anterior Cruciate Ligament Tunnel Reaming: An In Vitro Analysis. *ESSKA*, Amsterdam, The Netherlands, May 2014.

LaPrade RF. ACL Revisions *Leddskader og arthroskopisk kirurgi. Bløtdelsskader*, Hafjell, Norway, January 2014.

LaPrade RF. ACL Revisions: Techniques and Guidelines. *The Norwegian Arthroscopy Association Winter Meeting*, Kvittfjell, Norway, January 2014.

LaPrade RF. ACL Surgery: Current State of the Art ACL Basics. *Argentina Arthroscopy Association (AAA)*, Buenos Aires, Argentina, June 2014.

LaPrade RF. Acute Quadriceps Muscle Injuries. *ESSKA*, Amsterdam, The Netherlands, May 2014.

LaPrade RF. An Evidence-Based Approach to Complex and Multi-Ligamentous Injuries of the Knee. *AOSSM*, Seattle, WA, July 2014.

LaPrade RF. An Evidence-Based Approach to Medial Knee Injuries. *Grand Rounds, The Steadman Clinic*, Vail, CO, February 2014.

LaPrade RF. Anatomic Principles for Treating the PCL and PLC. *AOSSM*, Seattle, WA, July 2014.

LaPrade RF. Case Presentations and Panel Discussion. *AANA Fall Course*, Palm Desert, CA, November 2014.

LaPrade RF. Combined Anterior Cruciate Ligament (ACL) and Posterolateral Corner Injuries. *AAA*, Buenos Aires, Argentina, June 2014.

LaPrade RF. Combined Posterior Cruciate Ligament & Posterolateral Corner Injuries. Surgical Technique Video. *AAA*, Buenos Aires, Argentina, June 2014.

LaPrade RF. Current Concepts of Posterior Cruciate Ligament (PCL). *Grand Rounds, The Steadman Clinic*, Vail, CO, November 2014.

LaPrade RF. Current Updates on Meniscal Root Tears 2014. *Grand Rounds, The Steadman Clinic*, Vail, CO, June 2014.

LaPrade RF. Evaluation and Treatment of Multiple Ligament Knee Injuries. *Academic Session*, Bend, OR, April 2014.

LaPrade RF. Evidence-Based Approach to Complex and Multi-Ligamentous Injuries of the Knee: MCL, PCL, PLC. *AOSSM*, Seattle, WA, July 2014.

LaPrade RF. Expert Exam of the Knee and Enhanced Differential Diagnosis. *Orthopaedic and Spine Lecture Series*, Vail, CO, January 2014.

LaPrade RF. Fellowship Overview. *The Steadman Clinic*, Vail, CO, March 2014.

LaPrade RF. Improving Outcomes for PLC Injuries. *Grand Rounds, The Steadman Clinic*, Vail, CO, August 2014.

LaPrade RF. Initial Injury Management: Timing of ACL Surgery. *AAA*, Buenos Aires, Argentina, June 2014.

LaPrade RF. Lateral Knee Injuries, Anatomy, and Surgery. *AAA*, Buenos Aires, Argentina, June 2014.

LaPrade RF. Lateral Sided Injuries in the Multiple Ligament Injured Knee. *AAOS*, New Orleans, LA, March 2014.

LaPrade RF. Medial Knee Injuries, Anatomy, and Surgery. *AAA*, Buenos Aires, Argentina, June 2014.

LaPrade RF. Medial Knee Injuries. *AAOS*, New Orleans, LA, March 2014.

LaPrade RF. Medial/Posteromedial Ligament Reconstruction. Surgical Technique Video. *AAA*, Buenos Aires, Argentina, June 2014.

LaPrade RF. Meniscal Injuries. *Leddskader og arthroskopisk kirurgi. Bløtdelsskader*, Hafjell, Norway, January 2014.

LaPrade RF. PCL Anatomy and Biomechanics. *The Norwegian Arthroscopy Association Winter Meeting*, Kvittfjell, Norway, February 2014.

LaPrade RF. PCL Operative Technique. *The Norwegian Arthroscopy Association Winter Meeting*, Kvittfjell, Norway, February 2014.

LaPrade RF. PCL Postoperative Technique. *The Norwegian Arthroscopy Association Winter Meeting*, Kvittfjell, Norway, February 2014.

LaPrade RF. PLC Reconstructions: Technical and Rehabilitation Update. *AANA Fall Course*, Palm Desert, CA, November 2014.

LaPrade RF. Posterolateral Corner Reconstruction. *ESSKA*, Amsterdam, The Netherlands, May 2014.

LaPrade RF. Posterolateral Corner State of the Art 2014. Keynote Lecture. *AANA*, Hollywood, FL, May 2014.

LaPrade RF. Surgical Treatment of Acute and Chronic Medial Knee Injuries. *Leddskader og arthroskopisk kirurgi. Bløtdelsskader*, Hafjell, Norway, January 2014.

LaPrade RF. Treatment of Combined Posterior Cruciate Ligament (PCL) and Medial Knee Injuries. *AAA*, Buenos Aires, Argentina, June 2014.

LaPrade RF. Updates on Posterolateral Knee Injuries 2014. *Grand Rounds, The Steadman Clinic*, Vail, CO, September 2014.

LaPrade RF. What's New? New Surgical Technique for ACL Revisions. *AAA*, Buenos Aires, Argentina, June 2014.

LaPrade RF. What's New? PCL. *AAA*, Buenos Aires, Argentina, June 2014.

LaPrade RF. Why We Need to Perform Double Bundle PCL Reconstructions. *Vail International Complex Knee Symposium (VICKS)*, Vail, CO, July 2014.

LaPrade RF. Worst Case Scenario: The Disaster on My Doorstep and How I Managed It: Complex Knee Cases, Management, and Avoidance. *VICKS*, Vail, CO, July 2014.

LaPrade RF. Worst Case Scenario: The Disaster on My Doorstep and How I Managed It: Complex Knee Cases, Management, and Avoidance. *AAOS*, New Orleans, LA, March 2014.

LaPrade RF, Kennedy NI, Goldsmith MT, Michalski MP, Devitt BM, Årøen A, Engebretsen L. Kinematic Analysis of the Posterior Cruciate Ligament: The Individual and Collective Function of the Anterolateral and Posteromedial Bundles. *ESSKA*, Amsterdam, The Netherlands, May 2014.

LaPrade RF, Padalecki JR, Jansson KS, Smith SD, Dornan GJ, Pierce C, Wijdicks CA. Biomechanical Consequences of a Complete Radial Tear Adjacent to the Medial Meniscus Posterior Root Attachment Site. *AAOS–AOSSM Specialty Day*, New Orleans, LA, March 2014.

LaPrade RF, James EW, Surowiec RK, Doran G, Ellman MB, Gatlin C, Cram T, Ho CP. CT Versus MRI for Measurement of the Tibial Tubercle Trochlear Groove (TTTG) Distance. *ESSKA*, Amsterdam, The Netherlands, May 2014.

Lee JT, Millett PJ. Reconstruction of Chronic Distal Biceps Ruptures: Surgical Anatomy and Operative Technique. *AAOS*, New Orleans, LA, March 2014.

Lee JT, Campbell KJ, Michalski MP, Wilson KJ, Spiegl UJ, Wijdicks CA, Millett PJ. Surgical Anatomy of the Sternoclavicular Joint: A Qualitative and Quantitative Anatomical Study. *AAOS*, New Orleans, LA, March 2014.

Matheny LM, Warth RJ, Hurst JM, Briggs KK, Steadman JR. Comparison of Outcomes Following ACL Reconstruction Using Patellar-Tendon Autograft Versus Allograft. Podium. *AAOS*, New Orleans, LA, March 2014.

Matheny LM, Briggs KK, Abrams RF, Steadman JR. Do Expectations of Knee Treatment Change Based on Activity Level? Poster. *ESSKA*, Amsterdam, The Netherlands, May 2014.

Matheny LM, James EW, LaPrade RF. Outcomes After Anatomic Fibular Collateral Ligament Reconstruction. *ESSKA*, Amsterdam, The Netherlands, May 2014.

McCormick F, Thomas J, Salata M, Bedi A, Philippon MJ, Nho S. Labral Reconstruction With ITB Autograft Normalizes Hip Contact Pressure After Antero-superior Labral Resection: An In Vitro Biomechanical Analysis. *AANA*, Hollywood, FL, May 2014.

Millett PJ. AC & SC Joints: Indications, Repair, and Reconstructive Options. *AAOS/AOSSM Sports Medicine Course: From the Weekend Warrior to the Elite Athlete*, Park City, UT, February 2014.

Millett PJ. AC Joint and Clavicle Repairs. *Arthrex RSW Medical Advanced Shoulder*, Sioux Falls, SD, November 2014.

Millett PJ. AC Joint Dislocations and Clavicle Fractures. *Arthrex Masters Shoulder Course*, Vail, CO, February 2014.

Millett PJ. AC Joint Dislocations and Clavicle Fractures. *Arthrex Masters Shoulder Course*, Vail, CO, March 2014.

Millett PJ. AC Joint Dislocations and Clavicle Fractures. *Arthrex Masters Shoulder Course*, Vail, CO, November 2014.

Millett PJ. Acromioclavicular Joint Injuries. *US Air Force Academy*, Colorado Springs, CO, October 2014.

Millett PJ. Advancements in Instability Repair. *Arthrex RSW Medical Advanced Shoulder*, Sioux Falls, SD, November 2014.

Millett PJ. Advancements in Rotator Cuff Repair. *Arthrex Masters Shoulder Course*, Vail, CO, November 2014.

Millett PJ. Advancements in Rotator Cuff Repair. *Arthrex RSW Medical Advanced Shoulder*, Sioux Falls, SD, November 2014.

Millett PJ. Advancements in Rotator Cuff Repair. *Arthrex RSW Medical Advanced Shoulder*, Sioux Falls, SD, November 2014.

Millett PJ. Advancements in Rotator Cuff Repair. *Arthrex Masters Shoulder Course*, Vail, CO, February 2014.

Millett PJ. Advancements in Rotator Cuff Repair. *Arthrex Masters Shoulder Course*, Vail, CO, March 2014.

Millett PJ. Arthrex Cadaver Surgery Demonstration, SpeedBridge Rotator Cuff Repair With Biceps Tenodesis. *Sports Medicine Fellowship Completion Forum*, Naples, FL, May 2014.

Millett PJ. Arthroscopic Management of AC Joint Pathology. *AANA*, Hollywood, FL, May 2014.

Millett PJ. Arthroscopic Rotator Cuff Repair. *Orthopaedic Research Center, Colorado State University*, Ft. Collins, CO, May 2014.

Millett PJ. Arthroscopic Rotator Cuff Repair: Indications and Technique. Moderator. *AAOS*, New Orleans, LA, March 2014.

Millett PJ. Arthroscopic Rotator Cuff Repair: Optimizing Healing in 2014. *Nice Shoulder Course*, Paris, France, June 2014.

Millett PJ. Arthroscopic Single-Row vs Double-Row Rotator Cuff Repair: A Systematic Review & Meta-Analysis. *Nice Shoulder Course*, Paris, France, June 2014.

Millett PJ. Complications After Anatomic Fixation and Reconstruction of the Coracoclavicular Ligaments. *Nice Shoulder Course*, Paris, France, June 2014.

Millett PJ. Distal Biceps Tendon Rupture: Technique and Results. *AAOS/AOSSM Sports Medicine Course: From the Weekend Warrior to the Elite Athlete*, Park City, UT, February 2014.

Millett PJ. Double-Row Cuff Repair: Why Would You Do Less? Debate. *CU Sports Medicine Fall Symposium*, Boulder, CO, September 2014.

Millett PJ. How to Repair Partial- and Full-Thickness Tears of the Posterosuperior Rotator Cuff. *AAOS*, New Orleans, LA, March 2014.

Millett PJ. Instability Point/Counterpoint Discussions Instability: Anterior Instability With 25% Bone Loss. Moderator. *AANA Fall Course*, Palm Desert, CA, November 2014.

Millett PJ. Instability, Proximal/Distal Biceps, Glenoid Bone Loss. Wet Lab. *Arthrex RSW Medical Advanced Shoulder*, Sioux Falls, SD, November 2014.

Millett PJ. Irreparable Failed Rotator Cuff Repair (Type II Failure), Tendon Transfer or Reverse Arthroplasty Is Best. *AANA Fall Course*, Palm Desert, CA, November 2014.

Millett PJ. Joint Preservation Options for Shoulder Arthritis in Active Patients. *AANA*, Hollywood, FL, May 2014.

Millett PJ. Large to Massive Rotator Cuff Tears. *AAOS*, New Orleans, LA, March 2014.

Millett PJ. Massive Cuff Tears: Treatment. *CU Sports Medicine Fall Symposium*, Boulder, CO, September 2014.

Millett PJ. New Evidence on Cuff Repair. *AANA*, Hollywood, FL, May 2014.

Millett PJ. One-on-One Lab Session. *AANA Fall Course*, Palm Desert, CA, November 2014.

Millett PJ. Panel Debate: Single Row (Dr. Eric McCarth) Versus Double Row (Dr. Peter Millett). *Current Advances in Orthopaedic Sports Medicine and Trauma*, Naples, FL, February 2014.

Millett PJ. Panel Member for Case Presentations on Anterior Instability. *AAOS/AOSSM Sports Medicine Course: From the Weekend Warrior to the Elite Athlete*, Park City, UT, February 2014.

Millett PJ. Panel RCT in Overhead Athlete, PASTA Lesions, Scap Winging in 19 yo Female. *AAOS/AOSSM Sports Medicine Course: From the Weekend Warrior to the Elite Athlete*, Park City, UT, February 2014.

Millett PJ. Partial Cuff Tears and PASTA Lesions: Management in 2014. *AAOS/AOSSM Sports Medicine Course: From the Weekend Warrior to the Elite Athlete*, Park City, UT, February 2014.

Millett PJ. Percutaneous Pinning and Suture Plate for Proximal Humerus Fractures. *Arthrex 2014 Faculty Forum*, Naples, FL, January 2014.

Millett PJ. Physical Examination of the Shoulder. *Steadman Philippon Research Institute Academic Lecture*, Vail, CO, September 2014.

Millett PJ. Posterior Instability & MDI. *AAOS/AOSSM Sports Medicine Course: From the Weekend Warrior to the Elite Athlete*, Park City, UT, February 2014.

Millett PJ. Practical Pearls Spotlight #3: Biceps Tenodesis: Five Pearls to Make Reproducible. *AANA*, Hollywood, FL, May 2014.

Millett PJ. Proximal Humeral Fractures. *Current Advances in Orthopaedic Sports Medicine and Trauma*, Naples, FL, February 2014.

Millett PJ. Rotator Cuff Disease: Comprehensive Approach to Diagnosis and Treatment in 2014. *The Steadman Clinic*, Vail, CO, July 2014.

Millett PJ. Shoulder Arthroplasty Update. *Current Advances in Orthopaedic Sports Medicine and Trauma*, Naples, FL, February 2014.

Millett PJ. Si Surgical Spotlight: How I Do a Rotator Cuff Repair. Video Spotlight. *AOSSM*, Seattle, WA, July 2014.

Millett PJ. Speed Bridge. *Arthrex Prodigy Surgical Shoulder Dinner*, Vail, CO, March 2014.

Millett PJ. Surgical Advances: Acromioclavicular Instability, SLAP With and Without Biceps Tenodesis, and Glenohumeral Joint Chondral Lesions. *Combined Sections Meeting, Sports Physical Therapy*, Las Vegas, NV, February 2014.

Millett PJ. The Bony Bankart Lesion: What to Do? *CU Sports Medicine Fall Symposium*, Boulder, CO, September 2014.

Millett PJ. The Forgotten Partial Tear: Subcoracoid Impingement, Subscapularis Tears and Biceps Tendon Disorders. *AANA*, Hollywood, FL, May 2014.

Millett PJ. The SpeedBridge Cuff Repair: My Technique and Results. *Arthrex 2014 Faculty Forum*, Naples, FL, January 2014.

Millett PJ. Total Shoulder Arthroplasty. *Arthrex Masters Shoulder Course*, Vail, CO, November 2014.

Millett PJ. Total Shoulder Arthroplasty. *Arthrex RSW Medical Advanced Shoulder*, Sioux Falls, SD, November 2014.

Millett PJ. Total Shoulder Arthroplasty. *Arthrex Masters Shoulder Course*, Vail, CO, February 2014.

Millett PJ. Total Shoulder Arthroplasty. *Arthrex Masters Shoulder Course*, Vail, CO, March 2014.

Millett PJ. TSA & Elbow. Wet Lab. *Arthrex RSW Medical Advanced Shoulder*, Sioux Falls, SD, November 2014.

Millett PJ. Video Spotlight, Arthroscopic Repair of Bony Bankart lesions. *AAOS–AANA Specialty Day*, New Orleans, LA, March 2014.

Millett PJ. Wet Lab Instructor. *Arthrex Masters Shoulder Course*, Vail, CO, March 2014.

Millett PJ, Gaskill TR. Latissimus Dorsi Tendon Transfer for Treatment of Irreparable Posterosuperior Rotator Cuff Tears. *AAOS*, New Orleans, LA, March 2014.

Millett PJ, Warth RJ. Shoulder Fusion. Awarded Winning Video. *AAOS*, New Orleans, LA, March 2014.

Nepple JJ, Campbell KJ, Wijdicks CA, Jansson KS, Dornan GJ, LaPrade RF, Philippon MJ. The Effect of an Acetabular Labral Tear, Repair, Resection, and Reconstruction on the Hip Fluid Seal. *AAOS–AOSSM Specialty Day*, New Orleans, LA, March 2014.

Nepple JJ, Philippon MJ, Campbell KJ, Dornan GJ, Jansson KS, LaPrade RF, Wijdicks CA. The Effect of an Acetabular Labral Tear, Repair, Resection, and Reconstruction on Hip Fluid Pressurization. *AAOS*, New Orleans, LA, March 2014.

Philippon MJ. AANA Curbside Consult. *AANA*, Hollywood, FL, May 2014.

Philippon MJ. Acetabular Anatomic Anchor Placement: Size Matters. *ISHA*, Rio de Janeiro, Brazil, October 2014.

Philippon MJ. Acetabular Labral Reconstruction With Iliotibial Band Autograft: Outcome and Survivorship Analysis at Minimum 3 Years Follow-Up. Podium. *AAOS*, New Orleans, LA, March 2014.

Philippon MJ. Acetabular Labral Reconstruction. Mini-Debate. *Orthopaedic Summit Evolving Techniques Meeting*, Las Vegas, NV, December 2014.

Philippon MJ. Allograft Hip Capsulolabral Spacer for the Treatment of Capsulolabral Adhesions. Video Presentation with Q&A. *AAOS*, New Orleans, LA, March 2014.

Philippon MJ. Arthroscopic Capsular Reconstruction for Capsular Defect. *ISHA*, Rio de Janeiro, Brazil, October 2014.

Philippon MJ. Arthroscopic Capsular Repair/Reconstruction. Master Instructor. *AANA Masters Experience Hip Course*, Chicago, IL, September 2014.

Philippon MJ. Arthroscopic Management of Hip Labral Pathology and Impingement: 2014. *Instructional Course Lecture. AANA, Hollywood, FL, May 2014.*

Philippon MJ. Arthroscopy for CAM-Type FAI. Master Instructor. *AANA Masters Experience Hip Course, Chicago, IL, September 2014.*

Philippon MJ. Capsular Closure Is Essential—You Will Fail Otherwise. Podium. *Orthopaedic Summit Evolving Techniques Meeting, Las Vegas, NV, December 2014.*

Philippon MJ. Clinical Case Panel #4: Hip Arthroscopy: What to Do for Impingement and Labral Tears in 2014? Presenter and Moderator. *AANA, Hollywood, FL, May 2014.*

Philippon MJ. Cutting Edge Strategies to Address FAI and Other Potential Sources of Hip Pain. *AOSSM, Seattle, WA, July 2014.*

Philippon MJ. Diagnosing Osteoarthritis: How T2 Vales of Articular Cartilage in the Asymptomatic Hip Enhance Clinical Understanding of OA Pathology and Prevention. ePoster. *ESSKA, Amsterdam, The Netherlands, May 2014.*

Philippon MJ. Excess Radiation Is Totally Unnecessary. Podium. *Orthopaedic Summit Evolving Techniques Meeting, Las Vegas, NV, December 2014.*

Philippon MJ. FAI Surgery in Athletes: Outcomes Versus Non-Athletes. *Femoroacetabular Impingement Symposium. Hamilton, ON, Canada, May 2014.*

Philippon MJ. Global Perspectives on Labral Management: Anatomic Labral Repair and Reconstruction. *ISHA, Rio de Janeiro, Brazil, October 2014.*

Philippon MJ. Hip Arthroscopy in Professional Athletes – Experience Over 15 Years. *Herodicus Society Annual Meeting, Victoria, BC, July 2014.*

Philippon MJ. Hip Arthroscopy: The Application of Advanced Surgical Techniques and Related Patient Outcomes. *AAOS, New Orleans, LA, March 2014.*

Philippon MJ. Hip Arthroscopy: The Application of Advanced Surgical Techniques and Related Patient Outcomes. *ESSKA, Amsterdam, The Netherlands, May 2014.*

Philippon MJ. Hip Arthroscopy: The Application of Advanced Surgical Techniques and Related Patient Outcomes. Smith & Nephew Ask-the-Expert Session. *ESSKA, Amsterdam, The Netherlands, May 2014.*

Philippon MJ. Hip Instability. Moderator. *ISHA, Rio de Janeiro, Brazil, October 2014.*

Philippon MJ. Hip Patient Evaluation and Operative Set Up. Moderator. *International Hip Arthroscopy Meeting, Munich, Germany, November 2014.*

Philippon MJ. Hip Screening in the Elite Youth Tennis Player. Poster. *International Olympic Committee Conference on Prevention of Injury and Illness in Sport, Monte Carlo, Monaco, April 2014.*

Philippon MJ. How the Hip (and FAI) Affects the Knee and Leads to Knee Ligament Injuries. *Distinguished Faculty Lecture. VICKS, Vail, CO, July 2014.*

Philippon MJ. How to Make an Easy Central Compartment Approach. *Instructional Course Lecture. ESSKA, Amsterdam, The Netherlands, May 2014.*

Philippon MJ. Labral Debridement, Repair, and Reconstruction. Master Instructor. *AANA Masters Experience Hip Course, Chicago, IL, September 2014.*

Philippon MJ. Lecture and Case Presentations. *Grand Rounds. Department of Orthopaedic Surgery, Long Island Jewish Medical Center, New Hyde Park, NY, November 2014.*

Philippon MJ. Ligamentum Teres Deficient Hip: Reconstruction Might Be Considered. Podium. *AANA Fall Course, Palm Desert, CA, November 2014.*

Philippon MJ. Live Hip Arthroscopy Surgical Demonstration. Podium. *Smith & Nephew Vail Hip Arthroscopy Symposium, Beaver Creek, CO, March 2014.*

Philippon MJ. Live Hip Arthroscopy. *International Hip Arthroscopy Meeting, Munich, Germany, November 2014.*

Philippon MJ. Managing the Difficult Hip Preservation Case. Symposium. *Orthopaedic Summit Evolving Techniques Meeting, Las Vegas, NV, December 2014.*

Philippon MJ. Midterm Outcomes of Hip Arthroscopy. Podium. *Smith & Nephew Vail Hip Arthroscopy Symposium, Beaver Creek, CO, March 2014.*

Philippon MJ. Moderator Comments. Podium. *Orthopaedic Summit Evolving Techniques Meeting, Las Vegas, NV, December 2014.*

Philippon MJ. Off With the Head: Excessive Cam Decompression. *Instructional Course Lecture. AAOS, New Orleans, LA, March 2014.*

Philippon MJ. Panel Discussion: Evolving Technique: Endoscopic Releases. Moderator. *Orthopaedic Summit Evolving Techniques Meeting, Las Vegas, NV, December 2014.*

Philippon MJ. Panel Discussion: Questions & Answers. Moderator. *Orthopaedic Summit Evolving Techniques Meeting, Las Vegas, NV, December 2014.*

Philippon MJ. Panel Discussion: Sage Advice for Hip Arthroscopy—Faculty's One Tip! Chair. *Orthopaedic Summit Evolving Techniques Meeting, Las Vegas, NV, December 2014.*

Philippon MJ. Primary Procedure for Labral Insufficiency. Podium. *Orthopaedic Summit Evolving Techniques Meeting, Las Vegas, NV, December 2014.*

Philippon MJ. Pro Athletes and the Return to Sport. Podium. *Smith & Nephew Vail Hip Arthroscopy Symposium, Beaver Creek, CO, March 2014.*

Philippon MJ. Reconstruction of the Labrum. Podium. *International Hip Arthroscopy Meeting, Munich, Germany, November 2014.*

Philippon MJ. Surgical Management of Labral Tears During Femoroacetabular Impingement Surgery: A Systematic Review of the Literature. *XXXIII FIMS World Congress of Sports Medicine and Canadian Academy of Sport and Exercise Medicine, From Prevention to Performance, Quebec, Canada, June 2014.*

Philippon MJ. Tell Tale Heart: Heart Arrhythmia in Hip Arthroscopy. *Instructional Course Lecture. AAOS, New Orleans, LA, March 2014.*

Philippon MJ. The Capsule. Mini-Debate. *Orthopaedic Summit Evolving Techniques Meeting, Las Vegas, NV, December 2014.*

Philippon MJ. The Effect of an Acetabular Labral Tear, Repair, Resection, and Reconstruction on the Hip Fluid Seal. Podium. *AAOS-AOSSM Specialty Day, New Orleans, LA, March 2014.*

Philippon MJ. The Hip in Athletic Groin Pain. The Groin/Hip Enigma in Sports Session. Podium. *International Olympic Committee Advanced Team Physician Course, Manelieu, France, April 2014.*

Philippon MJ. The Importance of Education and Research in the Fast-Moving Field of Hip Preservation. *American Hip Institute Honorary Guest Speaker, New Orleans, LA, March 2014.*

Philippon MJ. The Role of the Ligamentum Teres. Podium. *Smith & Nephew Vail Hip Arthroscopy Symposium, Beaver Creek, CO, March 2014.*

Philippon MJ. Three to Seven Year Outcome and Survivorship Following Hip Arthroscopy in Dysplastic Hips. Game Changer. Podium. *AAOS, New Orleans, LA, March 2014.*

Philippon MJ. Treatment of Hip Pain in Athletes: Outcomes of Hip Arthroscopy in Athletes. Podium. *1st World Conference on Groin Pain in Athletes, Aspire Academy for Excellence, Aspetar Orthopaedic and Sports Medicine Hospital, Doha, Qatar, November 2014.*

Philippon MJ. Update: Labral and Capsular Reconstruction: When and Why? *AOSSM, Seattle, WA, July 2014.*

Philippon MJ. Use of Intraoperative Fluoroscopy Is Essential for Success. Mini-Debate. *Orthopaedic Summit Evolving Techniques Meeting, Las Vegas, NV, December 2014.*

Philippon MJ, Ho CP, Briggs KK, Ommen ND. Changes in the Hip of Youth Hockey Players Over 3 Seasons as Seen on MRI and Physical Exam. Podium. *AOSSM, Seattle, WA, July 2014.*

Philippon MJ, Faucett S, Briggs KK. Factors Associated With Total Traction Time During Hip Arthroscopy. Podium. *EFORT Congress, London, England, June 2014.*

Philippon MJ, Ferro F, Briggs KK. Hip Capsule Insufflation Volume at the Time of Arthroscopy Correlates With Hip Instability. A Preliminary Study. Poster. *AANA, Hollywood, FL, May 2014.*

Philippon MJ, Ferro F, Briggs KK. Hip Capsule Insufflation Volume at the Time of Arthroscopy Correlates With Hip Instability. A Preliminary Study. Poster. *ESSKA, Amsterdam, The Netherlands, May 2014.*

Philippon MJ, Ferro F, Briggs KK. Patient-Centered Outcomes Following Hip Arthroscopy for Femoroacetabular Impingement and Labral Tears Are Not Different Between Patients With Normal, High or Low Femoral Version. Poster. *ESSKA, Amsterdam, The Netherlands, May 2014.*

Philippon MJ, Faucett S, Briggs KK. Predictors of Traction Time During Hip Arthroscopy. ePoster. *AANA, Hollywood, FL, May 2014.*

Philippon MJ, Briggs KK. Relationship Between Femoral Anteversion and Outcomes After Hip Arthroscopy for FAI. Podium. *AANA, Hollywood, FL, May 2014.*

Rodkey WG. Biological Improvement of ACL Graft Healing. *Dublin Knee Surgery for Sports Injuries, Dublin, Ireland, September 2014.*

Rodkey WG. Biological Improvement of Meniscus Reconstruction. *Dublin Knee Surgery for Sports Injuries, Dublin, Ireland, September 2014.*

Rodkey WG. Cartilage Treatment in the USA: What's Proven and What's Not. *XIII Curso Internacional Teorico-Practico de Patologia de Rodilla (XIIIth International Theoretical and Practical Course on Knee Disorders), Madrid, Spain, January 2014.*

Rodkey WG. Collagen Meniscus Implants and Other Resorbable Meniscus Scaffolds. *XIII Curso Internacional Teorico-Practico de Patologia de Rodilla (XIIIth International Theoretical and Practical Course on Knee Disorders), Madrid, Spain, January 2014.*

Rodkey WG. Crucial Principles in Care of the Knee. *XXIII International Conference on Sports Rehabilitation and Traumatology: Football Medicine Strategies for Joint & Ligament Injuries, Milano, Italy, March 2014.*

Rodkey WG. Current Concepts of Cartilage Repair and Healing. *Dublin Knee Surgery for Sports Injuries, Dublin, Ireland, September 2014.*

Rodkey WG. Factors Associated With Complex Meniscus Tears Requiring Suture Repair. *AAOS, New Orleans, LA, March 2014.*

Rodkey WG. Meniscus Reconstruction: Collagen Meniscus Implants and Other Resorbable Meniscus Scaffolds. *Société Internationale de Chirurgie Orthopédique et de Traumatologie (SICOT) XXVI Triennial Orthopaedic World Congress and 46th Brazilian Congress of Orthopaedics and Traumatology, Rio de Janeiro, Brazil, November 2014.*

Rodkey WG. Osteochondral Defects—The Great Debate. Microfracture: The Vail Experience. *SICOT XXVI Triennial Orthopaedic World Congress and 46th Brazilian Congress of Orthopaedics and Traumatology, Rio de Janeiro, Brazil, November 2014.*

Rodkey WG. What's New in Meniscus Surgery: What's Hot and What's Not? *SICOT XXVI Triennial Orthopaedic World Congress and 46th Brazilian Congress of Orthopaedics and Traumatology, Rio de Janeiro, Brazil, November 2014.*

Sa De D, Phillips M, Philippon MJ, Letkemann S, Simunovic N, Ayeni O. Ligamentum Teres Injuries of the Hip: A Systematic Review Examining Surgical Indication, Treatment Options, and Outcomes. ePoster. *ISHA, Rio de Janeiro, Brazil, October 2014.*

Skendzel JG, Millett PJ, Warth RJ. Reverse Total Shoulder Arthroplasty: Surgical Technique. Feature Presentations. *AAOS, New Orleans, LA, March 2014.*

Skendzel JG, Briggs KK, Goljan P, Philippon MJ. Three to Seven Year Outcome and Survivorship Following Hip Arthroscopy in Dysplastic Hips. Selected for "Game Changer" Special Session. *AAOS*, New Orleans, LA, March 2014.

Spiegl UJ, Smith SD, Euler SA, Dornan GJ, Millett PJ, Wijdicks CA. Biomechanical Consequences of Coracoclavicular Reconstruction Techniques on Clavicle Strength. *AOSSM*, Seattle, WA, July 2014.

Spiegl UJ, Smith SD, Todd JN, Coatney GA, Wijdicks CA, Millett PJ. Biomechanical Comparison of Arthroscopic Single- and Double-Point Repair Techniques for Acute Bony Bankart Lesions. *AOSSM*, Seattle, WA, July 2014.

Steadman JR. Crucial Principles in Care of the Knee. *John Marshall Lecture. Hospital for Special Surgery*, New York, NY, April 2014.

Steadman JR. Thirty Year Perspective on Microfracture in Athletes. *Cartilage Repair Session. Hospital for Special Surgery*, New York, NY, April 2014.

Steadman JR. Thirty Years of Microfracture. *VICKS - Complex Knee Course*, Vail, CO, July 2014.

Steadman JR, Crespo B, Johnson N, Matheny L, Briggs KK. 10-Year Outcome Following Meniscus Repair Using Inside-Out Technique: A Comparative Cohort of Patients 40 Years and Older Versus Patients Younger Than 40. Podium. *AOSSM*, Seattle, WA, July 2014.

Steadman JR, Matheny LM, Warth RJ, Johnson NS, Briggs KK. Bone-Patellar Tendon-Bone Autograft vs. Allograft Anterior Cruciate Ligament Reconstruction: A Survivorship and Outcomes Analysis. Poster. *AANA*, Hollywood, FL, May 2014.

Steadman JR, Matheny LM, Warth RJ, Briggs KK. Comparison of Outcomes Following Anterior Cruciate Ligament Reconstruction Using Patellar-Tendon Autograft Versus Allograft. Podium. *AAOS*, New Orleans, LA, March 2014.

Steadman JR, Briggs KK, Rodkey WG. Microfracture Clinical Outcomes Are Not Influenced by Lesion Size: A Two to Eight Year Follow-Up Study. Feature Poster (Top 10 Posters). *AANA*, Hollywood, FL, May 2014.

Steadman JR, Abrams R, Briggs KK, Matheny LM. Survivorship Following Anterior Cruciate Ligament Reconstruction in Patients 40 Years or Older: 20 to 25 Year Follow-Up. Poster. *EFORT Congress*, London, England, June 2014.

Trindade CAC, Sawyer G, Briggs KK, Fukui K, Philippon MJ. Arthroscopic Reconstruction of the Hip Capsule: Surgical Technique. ePoster. *ISHA*, Rio de Janeiro, Brazil, October 2014.

Trindade CAC, Briggs KK, Fukui K, Philippon MJ. Relationship Between the FABER Distance Test and the Radiographic Alpha-Angle in Patients With FAI. ePoster. *ISHA*, Rio de Janeiro, Brazil, October 2014.

Trindade CAC, Philippon MJ, Rasmussen MT, Turnbull T, Hamming M, Ellman MB, Harris M, LaPrade RF, Wijdicks C. Tensile Properties of the Ligamentum Teres. ePoster. *ISHA*, Rio de Janeiro, Brazil, October 2014.

Wijdicks CA. Bracing Principles for the PCL and Multiple Ligament Injured Knee. *VICKS*, Vail, CO, July 2014.

Wijdicks CA. Key Static Knee Stabilizers – Collaterals. *VICKS*, Vail, CO, July 2014.

Wijdicks CA, Kennedy N, Goldsmith M, Devitt B, Michalski M, Årøen A, Engebretsen L, LaPrade RF. Kinematic Analysis of the Posterior Cruciate Ligament: A Comparison of Anatomic Single- Versus Double-Bundle Reconstruction. *ESSKA*, Amsterdam, The Netherlands, May 2014.

Wijdicks CA, Michalski MP, Rasmussen MT, Goldsmith MT, Kennedy NI, Lind M, Engebretsen L, LaPrade RF. Superficial Medial Collateral Ligament Anatomic Augmented Repair Versus Anatomic Reconstruction: An In Vitro Biomechanical Analysis. *ESSKA*, Amsterdam, The Netherlands, May 2014.

Wijdicks CA, Michalski MP, Rasmussen MT, Goldsmith MT, Kennedy NI, Lind M, Engebretsen L, LaPrade RF. Superficial Medial Collateral Ligament Anatomic Augmented Repair Versus Anatomic Reconstruction. *AAOS*, New Orleans, LA, March 2014.

Wijdicks CA, Philippon M, Nepple J, Campbell K, Dornan G, Jansson K, LaPrade RF. The Hip Fluid Seal: The Effect on an Acetabular Labral Tear, Repair, Resection, and Reconstruction. ePoster. *ESSKA*, Amsterdam, The Netherlands, May 2014.

Williams BT, Ahrberg A, Goldsmith MT, Campbell KJ, Shirley L, Wijdicks CA, LaPrade RF, Clanton TO. The Ankle Syndesmosis: A Qualitative and Quantitative Anatomical Investigation. *Deutscher Kongress für Orthopädie und Unfallchirurgie (DKOU)*, Berlin, Germany, October 2014.



INDEPENDENT AUDITORS' REPORT

INDEPENDENT AUDITORS' REPORT

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

We have audited the accompanying consolidated financial statements of Steadman Philippon Research Institute and Subsidiary, which are comprised of the consolidated statements of financial position as of December 31, 2014 and 2013, and the related consolidated statements of activities, functional expenses, and cash flows for the years then ended, and the related notes to the consolidated financial statements

MANAGEMENT'S RESPONSIBILITY FOR THE CONSOLIDATED FINANCIAL STATEMENTS

Management is responsible for the preparation and fair presentation of these consolidated financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of consolidated financial statements that are free from material misstatement, whether due to fraud or error.

AUDITORS' RESPONSIBILITY

Our responsibility is to express an opinion on these consolidated financial statements based on our audits. We conducted our audits in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the consolidated financial statements. The procedures selected depend on the auditors' judgment, including the assessment of the risks of material misstatement of the consolidated financial statements, whether due to fraud or error. In making those risk assessments, the auditors consider internal control relevant to the entity's preparation and fair presentation of the consolidated financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion

OPINION

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of Steadman Philippon Research Institute and Subsidiary as of December 31, 2014 and 2013, and the changes in their net assets and their cash flows for the years then ended in accordance with accounting principles generally accepted in the United States of America.

EKS&H LLLP

August 5, 2015
Denver, Colorado

Steadman Philippon Research Institute

Consolidated Statements of Financial Position

ASSETS	December 31,	
	2014	2013
Current assets		
Cash and cash equivalents	\$ 508,981	\$ 260,739
Accounts receivable	19,413	18,921
Accounts receivable, related parties	-	5,451
Contributions receivable, current portion	125,000	136,800
Prepaid expenses and other assets	185,961	27,189
Investments	5,038,396	5,175,573
Inventory	37,548	144,804
Total current assets	5,915,299	5,769,477
Contributions receivable, less current portion	70,377	92,421
Property and equipment, net	1,399,555	2,474,880
Investments - other	227,050	227,050
Deferred tax asset	36,880	14,885
Total assets	\$ 7,649,161	\$ 8,578,713
LIABILITIES AND NET ASSETS		
Current liabilities		
Accounts payable	\$ 171,139	\$ 157,686
Accounts payable, related parties	149,888	-
Accrued expenses	159,208	242,368
Line-of-credit	628,800	263,500
Current portion of capital leases	-	100,790
Total liabilities	1,109,035	764,344
Commitments		
Net assets		
Unrestricted	\$ 5,804,306	7,373,711
Temporarily restricted	735,820	440,658
Total net assets	6,540,126	7,814,369
Total liabilities and net assets	\$ 7,649,161	\$ 8,578,713

See notes to consolidated financial statement

Steadman Philippon Research Institute

Consolidated Statements of Activities

	For the Years Ended					
	December 31, 2014			December 31, 2013		
	Unrestricted	Temporarily Restricted	Total	Unrestricted	Temporarily Restricted	Total
REVENUES, GAINS, AND OTHER SUPPORT						
Contributions	\$ 905,504	\$ 496,349	\$ 1,401,853	\$ 955,974	\$ 698,898	\$ 1,654,872
Fundraising events	966,663	-	966,663	828,820	-	828,820
Grants and corporate partners	1,114,998	810,822	1,925,820	1,048,142	742,613	1,790,755
MRI income	723,000	-	723,000	962,514	-	962,514
Other income	4,123	-	4,123	2,133	-	2,133
In-kind contributions	30,799	-	30,799	111,071	-	111,071
	3,745,087	1,307,171	5,052,258	3,908,654	1,441,511	5,350,165
Net assets released from restrictions	1,012,009	(1,012,009)	-	2,368,558	(2,368,558)	-
Total revenues, gains, and other support	4,757,096	295,162	5,052,258	6,277,212	(927,047)	5,350,165
Expenses and losses						
BioMedical engineering	1,309,259	-	1,309,259	1,487,659	-	1,487,659
Center for translational and regenerative medicine research	288,060	-	288,060	241,760	-	241,760
Surgical skills laboratory	953,547	-	953,547	996,620	-	996,620
Center for outcomes-based orthopaedic research	756,565	-	756,565	851,876	-	851,876
Education department	522,845	-	522,845	577,207	-	577,207
Department of technology and multimedia communications	313,785	-	313,785	304,200	-	304,200
Imaging research	562,028	-	562,028	601,782	-	601,782
Management and general	451,224	-	451,224	625,659	-	625,659
Development	924,165	-	924,165	928,356	-	928,356
Total expenses	6,081,478	-	6,081,478	6,615,119	-	6,615,119
Other (expense) income						
Investment (loss) return	(147,547)	-	(147,547)	578,194	-	578,194
Interest expense	(16,966)	-	(16,966)	(64,657)	-	(64,657)
Total other (expense) income	(164,513)	-	(164,513)	513,537	-	513,537
Rescinded pledge	(90,000)	-	(90,000)	-	-	-
Provision for income tax	9,490	-	9,490	118,939	-	118,939
Change in net assets	(1,569,405)	295,162	(1,274,243)	294,569	(927,047)	(632,478)
Net assets at beginning of year	7,373,711	440,658	7,814,369	7,079,142	1,367,705	8,446,847
Net assets at end of year	\$ 5,804,306	\$ 735,820	\$ 6,540,126	\$ 7,373,711	\$ 440,658	\$ 7,814,369

See notes to consolidated financial statement

Steadman Philippon Research Institute

Consolidated Statement of Functional Expenses

For the Year Ended December 31, 2014

	Program Services							Support Services			Total
	BioMedical Engineering	Center for Translational Regenerative Medicine Research	Surgical Skills Laboratory	Center for Outcomes-Based Orthopaedic Research	Education Department	Department of Technology and Multimedia Communications	Imaging Research	Total Program Services	Management and General	Development	
Salaries and benefit	\$ 538,822	\$ 155,280	\$ 92,909	\$ 624,885	\$ 369,212	\$ 189,611	\$ 170,371	\$ 2,141,090	\$ 374,804	\$ 219,303	\$ 2,735,197
Consulting and contract labor	25,624	6,360	1,110	9,470	1,680	44,608	98,685	187,537	12,547	5,940	206,024
Supplies (office, compute, lab)	262,147	653	238,438	20,254	1,761	4,352	2,688	530,293	2,438	985	533,716
Events and fundraising	-	-	-	-	-	-	-	-	-	377,217	377,217
Printing	12,747	136	233	5,795	737	370	204	20,222	562	57,404	78,188
Maintenance and supplies	28,657	7,010	14,559	8,307	3,809	2,316	1,084	65,742	4,978	3,171	73,891
Rent and leases	53,040	5,121	26,973	33,403	5,723	25,024	7,381	156,665	4,226	2,921	163,812
Telephone and utilities	73,166	8,421	37,159	9,315	6,371	8,694	8,940	152,066	14,804	2,570	169,440
Travel	21,443	42,811	-	13,724	15,263	1,830	9,648	104,719	575	526	105,820
Legal and accounting	11,864	1,043	1,043	15,828	17,116	3,628	4,939	55,461	8,176	2,783	66,420
Fellows	-	-	-	-	36,963	-	2,136	39,099	-	-	39,099
Education meetings/lectures	-	2,500	-	-	33,304	-	-	35,804	-	-	35,804
Direct mail/planned giving	-	-	-	-	-	-	-	-	-	132,069	132,069
Meals and entertainment	6,578	2,277	-	657	4,792	182	1,253	15,739	1,703	150	17,592
Gifts	-	838	-	72	-	-	150	1,060	85	343	1,488
Postage	1,901	232	249	2,547	1,218	531	258	6,936	759	6,521	14,216
Insurance	1,166	159	159	1,642	742	424	159	4,451	20,065	371	24,887
Fees, dues and subscriptions	2,619	2,543	-	723	20,616	429	4,825	31,755	1,022	375	33,152
Bank/credit card fees	56	-	-	-	-	-	173	229	1,795	9,441	11,465
Meetings (Board and SAC)	-	51,635	-	-	-	-	-	51,635	673	-	52,308
Advertising	1,590	-	-	-	90	1,118	2,940	5,738	-	100,662	106,400
	1,041,420	287,019	412,832	746,622	519,397	283,117	315,834	3,606,241	449,212	922,752	4,978,205
Depreciation and amortization	267,839	1,041	540,715	9,943	3,448	30,668	246,194	1,099,848	2,012	1,413	1,103,273
Total	\$ 1,309,259	\$ 288,060	\$ 953,547	\$ 756,565	\$ 522,845	\$ 313,785	\$ 562,028	\$ 4,706,089	\$ 451,224	\$ 924,165	\$ 6,081,478

See notes to consolidated financial statement

Steadman Philippon Research Institute

Consolidated Statement of Functional Expenses

For the Year Ended December 31, 2013

	Program Services							Support Services			
	BioMedical Engineering	Center for Translational Regenerative Medicine Research	Surgical Skills Laboratory	Center for Outcomes-Based Orthopaedic Research	Education Department	Department of Technology and Multimedia Communications	Imaging Research	Total Program Services	Management and General	Development	Total
Salaries and benefit	\$ 666,245	\$ 155,314	\$ 83,449	\$ 699,376	\$ 394,540	\$ 213,133	\$ 79,788	\$ 2,291,845	\$ 271,939	\$ 312,013	\$ 2,875,797
Consulting and contract labor	22,487	12,366	360	32,419	366	1,512	50,376	119,886	226,232	162,122	508,240
Supplies (office, compute , lab)	290,380	652	270,890	20,660	2,462	9,416	3,232	597,692	4,275	5,402	607,369
Events and fundraising	-	-	-	-	-	-	-	-	-	292,487	292,487
Printing	31,689	585	451	4,131	351	1,159	314	38,680	1,161	30,566	70,407
Maintenance and supplies	34,980	4,548	18,809	6,758	2,444	2,332	979	70,850	3,067	1,091	75,008
Rent and leases	53,219	5,647	26,349	9,494	5,130	27,174	36,461	163,474	10,538	3,034	177,046
Telephone and utilities	68,466	8,242	35,011	8,859	6,170	8,752	8,589	144,089	7,056	2,568	153,713
Travel	16,978	24,301	760	26,171	25,115	289	5,000	98,614	44,158	103	142,875
Legal and accounting	17,429	1,106	1,108	11,794	24,549	3,894	5,326	65,206	9,772	2,949	77,927
Fellows	-	-	-	-	22,750	-	5,111	27,861	-	-	27,861
Education meetings/lectures	-	2,500	-	-	46,168	-	-	48,668	-	-	48,668
Direct mail/planned giving	-	-	-	-	-	-	-	-	-	98,164	98,164
Meals and entertainment	3,841	1,266	744	2,859	11,737	-	250	20,697	1,893	254	22,844
Gifts	1,104	1,420	1,045	1,517	632	379	253	6,350	6,010	452	12,812
Postage	2,116	170	636	1,768	475	612	371	6,148	703	14,664	21,515
Insurance	1,673	157	157	1,673	157	523	157	4,497	17,371	418	22,286
Meeting fees/registrations, dues and subscriptions	4,485	2,786	150	4,835	24,561	179	5,509	42,505	814	475	43,794
Bank/credit card fees	41	-	25	-	-	-	-	66	12,053	155	12,274
Meetings (Board and SAC)	-	19,659	-	-	-	-	-	19,659	4,945	-	24,604
Advertising	-	-	-	628	90	-	-	718	-	-	718
	1,215,133	240,719	439,944	832,942	567,697	269,354	201,716	3,767,505	621,987	926,917	5,316,409
Depreciation and amortization	272,526	1,041	556,676	18,934	9,510	34,846	400,066	1,293,599	3,672	1,439	1,298,710
Total	\$ 1,487,659	\$ 241,760	\$ 996,620	\$ 851,876	\$ 577,207	\$ 304,200	\$ 601,782	\$ 5,061,104	\$ 625,659	\$ 928,356	\$ 6,615,119

See notes to consolidated financial statement

Steadman Philippon Research Institute

Consolidated Statements of Cash Flows

	For the Years Ended December 31,	
	2014	2013
Cash flows from operating activities		
Change in net assets	\$ (1,274,243)	\$ (632,478)
Adjustments to reconcile change in net assets to net cash used in operating activities		
Depreciation and amortization expense	1,103,273	1,298,710
Net loss (gain) on investments	128,586	(615,165)
Rescinded pledge	90,000	-
Amortization of deferred rent	-	(153,616)
Donated stock	(43,644)	(15,933)
Deferred taxes	(21,995)	(21,310)
Changes in assets and liabilities		
Accounts receivable	4,959	(928)
Contributions receivable	(56,156)	206,921
Prepaid expenses and other assets	(158,772)	(26,212)
Inventory	107,256	80,378
Accounts payable	163,341	(41,699)
Accrued expenses	(83,160)	(94,329)
	1,233,688	616,817
Net cash used in operating activities	(40,555)	(15,661)
Cash flows from investing activities		
Purchase of investments	-	(581,837)
Proceeds from sale of investments	52,235	643,645
Purchases of property and equipment	(27,948)	(80,268)
Net cash provided by (used in) investing activities	24,287	(18,460)
Cash flows from financing activities		
Payments on capital leases	(100,790)	(433,126)
Payments on long-term debt	-	(938,172)
Net borrowings on line-of-credit	365,300	263,500
Net cash provided by (used in) financing activities	264,510	(1,107,798)
Net increase (decrease) in cash and cash equivalents	248,242	(1,141,919)
Cash and cash equivalents at beginning of year	260,739	1,402,658
Cash and cash equivalents at end of year	\$ 508,981	\$ 260,739

Supplemental disclosure of cash flow information

Cash paid for interest was \$16,966 and \$64,657 for the years ended December 31, 2014 and 2013, respectively.

Steadman Philippon Research Institute

Notes to Consolidated Financial Statements

NOTE 1

ORGANIZATION AND SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

ORGANIZATION

The Steadman Philippon Research Institute ("SPRI"), a non profit organization, was incorporated in the state of Colorado on February 22, 1999 and was founded in 1988. SPRI is located in Vail, Colorado, and is dedicated to keeping people of all ages physically active through orthopaedic research and education in the areas of arthritis, healing, rehabilitation, and injury prevention. SPRI's primary sources of support are public donations, grants, special events, and corporate partners.

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

SPRI created the SPRI Leasing Corporation ("Subsidiary"), a wholly owned subsidiary, in order to hold the assets, liabilities, revenues, and expenses derived from SPRI's MRI scanner.

PRINCIPLES OF CONSOLIDATION

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

BASIS OF PRESENTATION

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

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

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

Permanently restricted amounts are assets that must be maintained permanently by the Institute as required by the donor, but the Institute is permitted to use or expend part or all of any income derived from those assets. As of December 31, 2014 and 2013, 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.

ACCOUNTS AND CONTRIBUTIONS RECEIVABLE

Accounts and contributions receivable represent amounts due from individuals and organizations in support of the Institute's programs. Management considers all amounts collectible; therefore, no allowance has been recorded as of December 31, 2014 and 2013.

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 effective interest method and is reported as contribution revenue.

INVESTMENTS

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

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

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

INVENTORY

Inventory is stated at the lower of cost (first-in, first-out method) or market. Inventory consists of donated medical supplies of medical implants used for medical research.

PROPERTY AND EQUIPMENT

Leasehold 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 three to seven 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 was recorded at estimated fair value at the date of donation. The investment is assessed for impairment if events and circumstances warrant such a review. No such impairment was recognized during 2014 or 2013.

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 a purpose restriction is accomplished, temporarily restricted net assets are reclassified to unrestricted net assets and reported in the consolidated statements of activities as net assets released from restrictions.

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

REVENUE RECOGNITION

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

FUNCTIONAL EXPENSES

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

RESCINDED PLEDGE

During the year ended December 31, 2014, a donor notified the Institute that they were rescinding the remaining \$90,000 of a pledge made in 2010. The Institute did not have any rescinded pledges during the year ended December 31, 2013.

INCOME TAXES

SPRI is exempt from federal income taxes under Section 501(c)(3) of the Internal Revenue Code ("IRC"). SPRI is not a private foundation within the meaning of Section 509(a) of the IRC.

The Subsidiary is a for profit corporation that is required to file a corporate income tax return for its operations and recognizes deferred tax assets and liabilities based upon differences between its basis of assets for tax and financial reporting purposes

The Institute applies a more-likely-than-not measurement methodology to reflect the financial statement impact of uncertain tax positions taken or expected to be taken in a tax return. After evaluating the tax positions taken, none are considered to be uncertain; therefore, no amounts have been recognized as of December 31, 2014 and 2013. 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, 2014 or 2013. Tax returns that remain subject to examination include 2011 through the current year for federal returns and 2010 through the current year for state returns.

USE OF ESTIMATES

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

SUBSEQUENT EVENTS

The Institute has evaluated all subsequent events through the auditors' report date, which is the date the consolidated financial statements were available for issuance.

NOTE 2

FAIR VALUE MEASUREMENTS AND INVESTMENTS

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

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

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

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

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

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

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

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

There have been no changes to valuation methodologies during the years ended December 31, 2014 and 2013.

Financial assets carried at fair value as of December 31, 2014 are classified in the table below in one of the three categories described above.

Description	Level 1	Level 2	Level 3	Total
Common stock	\$ 24,697	\$ -	\$ -	\$ 24,697
Equity mutual funds	758,011	-	-	758,011
Limited partnerships	-	3,562,712	-	3,562,712
Total	\$ 782,708	\$ 3,562,712	\$ -	\$ 4,345,420

Financial assets carried at fair value as of December 31, 2013 are classified in the table below in one of the three categories described above.

Description	Level 1	Level 2	Level 3	Total
Common stock	\$ 15,981	\$ -	\$ -	\$ 15,981
Equity mutual funds	785,304	-	-	785,304
Limited partnerships	-	3,749,666	-	3,749,666
Total	\$ 801,285	\$ 3,749,666	\$ -	\$ 4,550,951

Included in investments on the consolidated statements of financial position are money market funds in the amount of \$692,976 and \$624,622 at December 31, 2014 and 2013, respectively, which are not subject to fair value classification.

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

Fund Description	December 31, 2014	December 31, 2013	Unfunded	Redemption	Redemption
	Fair Value	Fair Value	Commitments	Frequency	Notice Period
Absolute Return Funds	\$ 3,562,712	\$ 3,749,666	None	Quarterly to Annually	30 to 90 Days

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

Investment return consists of the following:

	For the years ended December 31,	
	2014	2013
Dividends and interest - reinvested	\$ 20	\$ 73
Net realized and unrealized (losses) gains	(128,586)	615,165
Fees	(18,981)	(37,044)
Total return on investments	\$ (147,547)	\$ 578,194

NOTE 3 CONTRIBUTIONS

Contributions receivable consist of the following:

	December 31,	
	2014	2013
Due in less than one year	\$ 125,000	\$ 136,800
Due in one to five year	75,000	100,000
	200,000	236,800
Less unamortized discount	(4,623)	(7,579)
	\$ 195,377	\$ 229,221

The discount rate used was 3.25% for 2014 and 2013.

NOTE 4 PROPERTY AND EQUIPMENT

The Institute's property and equipment consist of the following:

	December 31,	
	2014	2013
Equipment	\$ 538,388	\$ 554,828
Furniture and fixture	142,019	137,814
Leasehold improvements	2,107,558	2,107,558
Machines and video equipment	1,151,086	1,148,087
Medical equipment	4,301,646	4,301,646
	8,240,697	8,249,933
Less accumulated depreciation and amortization	(6,841,142)	(5,775,053)
	\$ 1,399,555	\$ 2,474,880

NOTE 5 LINE-OF-CREDIT

The Institute has an unsecured line of credit with a bank available up to \$1,500,000, which bears interest at the prime rate plus 0.50% with a floor of 3.75% (3.75% at December 31, 2014) and matures in March 2018. As of December 31, 2014 and 2013, the outstanding balance was \$628,800 and \$263,500, respectively.

NOTE 6 CAPITAL LEASE

The Institute acquired assets under the provisions of a capital lease. For financial reporting purposes, minimum lease payments relating to the assets have been capitalized. The lease expired in March 2014 and the ownership of the equipment transferred to the Institute upon the final payment on the capital lease.

NOTE 7 RETIREMENT PLAN

The Institute has a defined contribution retirement plan (the "Plan") under IRC Section 401(k). Employees are eligible to participate in the Plan after one year of service. The Institute's contributions to the Plan are determined annually. The Institute contributed \$32,957 and \$36,639 to the Plan in fiscal years 2014 and 2013, respectively.

NOTE 8 TEMPORARILY RESTRICTED NET ASSETS

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

	December 31,	
	2014	2013
Assets available for		
Biomedical Engineering	\$ 480,288	\$ -
Administration	60,215	-
Education	-	211,437
	540,433	211,437
Assets available in future periods		
Education	50,000	74,213
Center for outcomes-based orthopaedic research	120,377	21,800
Time restricted only	25,000	133,208
Total contributions receivable	195,377	229,221
	\$ 735,820	\$ 440,658

NOTE 9**RELATED PARTY TRANSACTIONS**

During 2014 and 2013, the Institute received approximately \$1,135,000 and \$984,000, respectively, in contributions from related parties, including various Board members, employees, and medical staff at The Steadman Clinic (the "Clinic").

In addition, the Institute received \$723,000 and \$962,514 from the Clinic during 2014 and 2013, respectively, as a corporate sponsor and for the use of certain equipment. The balance due (to) from the Clinic totaled \$(149,888) and \$5,451 as of December 31, 2014 and 2013, respectively.

The Institute owed a Board member \$30,000 for contracted management services, which was included in accounts payable as of December 31, 2013.

NOTE 10**INCOME TAXES**

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

	For the Years Ended December 31,	
	2014	2013
Current		
Federal	\$ 12,000	\$ (86,000)
State	1,000	(12,000)
	13,000	(98,000)
Deferred		
Federal	(20,000)	(19,000)
State	(2,000)	(2,000)
	(22,000)	(21,000)
	\$ (9,000)	\$ (119,000)

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

NOTE 11**COMMITMENTS****OPERATING LEASES**

The Institute leases facilities under non cancelable operating leases expiring between January 2014 and February 2016, which call for both base rent payments and operating expenses. Rent under these leases for the years ended December 31, 2014 and 2013 was \$321,064 and \$316,502, respectively.

Future minimum lease payments under these leases are approximately as follows:

Year Ending December 31,	
2015	\$ 127,000
2016	11,000
	\$ 138,000



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segments for the purpose of obtaining images used for quantitative analysis. The manual process of segmenting these images is extremely time-consuming. SPRI's Imaging Research, the University of Queensland, and CSIRO are investigating ways to automate the process, which will allow it to be more practical for routine use and more reproducible for medical and scientific purposes.

Imaging Research and Colorado State University (CSU) have mutually benefited from a long-term collaboration. CSU is now launching its Institute for Biologic Translational Therapies, which will investigate next-generation remedies based on living cells and their products, including patient-derived stem cells, to treat musculoskeletal disease and other ailments. Imaging will be a component of the expanded program, and SPRI will be involved in development of the CSU program.

PUBLICATIONS AND PRESENTATIONS

During 2014, Dr. Ho and his SPRI colleagues produced 12 imaging-related scholarly articles in the following peer reviewed journals:

- *Journal of Magnetic Resonance Imaging*
- *Cartilage OnlineFirst*
- *Arthroscopy*
- *European Journal of Radiology*
- *Knee Surgery, Sports Traumatology, Arthroscopy*
- *Cartilage*
- *Foot & Ankle International*

Dr. Ho and his colleagues also made imaging-related presentations at national and international scientific conferences:

- Vail, Colorado (Vail Hips Arthroscopy Symposium)
- Breckenridge, Colorado (Veterinary Orthopedic Society)
- Las Vegas, Nevada (31st Annual Magnetic Resonance Imaging National Symposium)
- Hollywood, Florida (Arthroscopy Association of North America)

- Amsterdam, The Netherlands (European Society of Sports Traumatology, Knee Surgery, & Arthroscopy)
- London, England (15th EFORT Congress)
- Oxfordshire, England (Magnetom World Summit)
- Seattle, Washington (American Orthopaedic Society for Sports Medicine)
- Heidelberg, Germany (Heidelberg Summer School, University Hospital Heidelberg)

PROJECTIONS

Imaging Research will continue its efforts to support the Steadman Philippon Research Institute mission of keeping people of all ages physically active through orthopaedic research and education.

Dr. Ho and his staff will evaluate and continue Imaging Research's collaborative initiatives with institutions, universities, organizations, and corporations in the United States and other countries, including CSU, Siemens, the University of Queensland, and the CSIRO.

Imaging Research looks forward to continued cooperation with each department, center, and unit at the Steadman Philippon Research Institute, including its new Center for Regenerative Sports Medicine.



Jorge Chahla, Argentina

THE EUROPEAN VISITING SCHOLAR, DEVELOPED AND SPONSORED BY ARTHREX, INC., HAS BECOME THE MODEL FOR OUR VISITING SCHOLARS PROGRAMS

The SPRI Visiting Scholars Program is sponsored by corporate and individual donors. Our program was developed in conjunction with Arthrex, Inc., an orthopaedic medical device company. Arthrex's founder and president, Reinhold Schmieding, has had a long-time interest in education. Mr. Schmieding approached SPRI with an idea for educating a European orthopaedic surgeon with interest in research, committed to funding it, and the Visiting Scholars Program was created.

Mr. Schmieding commented, "Arthrex is pleased to contribute annually to the Institute. The sponsoring of a European research fellow exemplifies Arthrex's commitment to orthopaedic research to advance knowledge of the global medical community and to helping surgeons treat their patients better."

Arthrex, Inc., is annually sponsoring the European Visiting Scholars Program, and because of its success, Jorge Paulo Lemann is supporting our Brazilian Visiting Scholar. These scholars learn new surgical techniques and conduct research, which is submitted for publication in leading orthopaedic journals.

ASSOCIATES

The Institute is proud to recognize its team of associates who carry out the research and educational mission in Vail. The staff has been selected for its diverse training and background in stem cell and musculoskeletal cellular therapeutics research, 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.

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