STEADMAN PHILIPPON RESEARCH INSTITUTE

10 YEARS OF CUTTING-EDGE SCIENCE

THE STEADMAN CLINIC
AND
STEADMAN PHILIPPON
RESEARCH INSTITUTE

STEADMAN PHILIPPON RESEARCH INSTITUTE

INSTITUTE MISSION

BUILDING ON OUR LEGACY OF EXCELLENCE IN ORTHOPAEDIC SPORTS MEDICINE, STEADMAN PHILIPPON RESEARCH INSTITUTE IS UNLOCKING THE SECRETS OF HEALING, FINDING CURES AND ENHANCING LIVES THROUGH GLOBAL LEADERSHIP IN REGENERATIVE MEDICINE, SCIENTIFIC RESEARCH, INNOVATION AND EDUCATION.

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DEAR READERS,

Since joining Steadman Philippon Research Institute (SPRI) in 2015, I've seen tremendous growth and change in our institute, from launching new departments and advancing our laboratories to earning major federal awards and initiating clinical trials. It is in this spirit of reflection that the team and I have put together a publication, which chronicles the past ten years of scientific research at SPRI.

Members of the scientific community reading this letter know that scientific advancement takes time, and it's one of the reasons I'm so proud of what SPRI has accomplished over the past decade. When I joined the team, SPRI had not yet established its regenerative medicine program, nor had the organization received federal awards from the National Institutes of Health (NIH) or Department of Defense (DoD). Today, SPRI's regenerative medicine program—the Linda & Mitch Hart Center for Regenerative and Personalized Medicine (CRPM)—alongside the other multidisciplinary teams at SPRI—the Center for Outcomes-Based Orthopaedic Research (COOR) and Department of Biomedical Engineering (BME)—have been awarded several federal grants, and the institute is actively conducting clinical trials with our physician partners at The Steadman Clinic.

SPRI has grown—more PhDs and MDs have joined our organization, and SPRI joined in The Steadman Clinic's expansion to the Roaring Fork Valley, running a regenerative medicine laboratory within the Steadman Philippon Orthopaedic Center in Basalt, Colorado. As more physicians have joined The Steadman Clinic, more patients and surgeries are being tracked in our robust orthopaedic outcomes database. This database now covers over thirty-five years of data, and is the longest-standing orthopaedic outcomes database worldwide.

Over the past ten years, SPRI's science has advanced, and our diverse team of researchers and scientists have made strides not only in orthopaedics and sports medicine research, but also in healthy aging and regenerative therapeutics, applicable beyond the limits of musculoskeletal disorders. SPRI is committed to the acceleration of translational clinical science, and our network includes universities, private institutions, industry partners, and hospitals and health systems.

Following the 2024 Vail Scientific Summit, SPRI established an external Scientific Advisory Board (SAB), comprised of world-class scientists and researchers. Over several months, the SAB conducted a 10-year review of SPRI's science, and I'm pleased to share excerpts from their report within this publication. Thank you to our SAB for their thoughtful, comprehensive review.

Now, I'm pleased to share our special ten-year publication, featuring the past decade of science at SPRI. Our research is made possible thanks to the generosity of philanthropists and foundations, along with federal awards and industry grants. Thank you for your support of SPRI.

Respectfully Yours,

JOHNNY HUARD, PHD
Chief Scientific Officer

SCIENTIFIC ADVISORY BOARD CONDUCTS 10-YEAR REVIEW OF SPRI'S SCIENCE

ESTABLISHED IN AUGUST 2024, THE SPRI SCIENTIFIC ADVISORY BOARD (SAB) IS AN EXTERNAL BOARD OF TOP ORTHOPAEDIC SCIENTISTS.

The SAB includes Chair Mark Markel, PhD, President of the AO Foundation and former Dean of the School of Veterinary Medicine at University of Wisconsin-Madison; Board Members William Murphy, PhD, of University of Wisconsin-Madison; Francis Hornicek, MD, PhD, of University of Miami; Sam Stupp, PhD, of Northwestern University and Julie Allickson, PhD of Mayo Clinic. The SAB conducted a comprehensive 10-year review of science at SPRI, including an on campus visit in February 2025. Following the visit and research audit, the SAB shared the following key remarks in their executive summary review.

"Over the past 10 years, Steadman Philippon Research Institute (SPRI) has made remarkable progress in all categories, including basic science, clinical translation and training.

"This remarkable progress has been driven by an outstanding CSO, a competent scientific team, tremendous support from clinicians at The Steadman Clinic, and support from an extensive list of donors and partners.

"The SPRI approach to optimizing patient outcomes via biologics development, clinical trial establishment, and patient outcome research ('before surgery, during surgery, after surgery') is impressive and impactful.

"SPRI has established collaborations with a vast network of leading researchers, significantly amplifying their impact on basic and translational research.

"The SAB Sub-Committee's general impression is that SPRI has become a highly functional research institute, and is positioned well for success in the current, highly competitive biomedical research climate."

CONGRATULATIONS TO SPRI FOR AN INCREDIBLE 10 YEARS OF SCIENTIFIC IMPACT.

PROXIMITY TO CLINIC, MULTIDISCIPLINARY LABS AND TEAM SCIENCE CREATE PERFECT CONDITIONS FOR CUTTING-EDGE SCIENCE AT STEADMAN PHILIPPON RESEARCH INSTITUTE

Steadman Philippon Research Institute's Vail campus is co-located with The Steadman Clinic within Vail Health Hospital

The symbiotic relationship between The Steadman Clinic and Steadman Philippon Research Institute (SPRI) has often been billed as the "special sauce," a differentiator that allows for rapid clinical translation and ensures the practice of evidence-based medicine, using the latest therapies and techniques. As The Steadman Clinic—a world-renowned sports medicine and orthopaedic practice—has grown, so too has SPRI, including the addition of state-of-the-art laboratories and departments, alongside the institute's first federal grants and awards from the National Institutes of Health (NIH) and Department of Defense (DoD). As the past decade has shown tremendous growth in SPRI's research, it has also firmly solidified its mission to make an enduring clinical impact on orthopaedic and musculoskeletal conditions.

MISSION-DRIVEN TEAM SCIENCE

SPRI's mission includes the messaging, "building on our legacy of excellence in orthopaedic sports medicine," and the institute achieves this with a multidisciplinary approach to scientific research. SPRI's scientific departments—the Center for Outcomes-Based Orthopaedic Research (COOR), Department of Biomedical Engineering (BME) and the Linda & Mitch Hart Center for Regenerative and Personalized Medicine (CRPM)—work together to provide a comprehensive approach to science. BME's Advanced Imaging, including a 3-Tesla MRI, the Donna M. Giordano & Family Center for Biomotion Research and other tools, provide robust evidentiary support of regenerative medicine studies, helping to demonstrate the effect of therapeutic treatments and interventions within the body. SPRI's longest standing department, COOR, not only provides patient-reported outcomes, but also acts as a data center for each of SPRI's clinical trials and multidisciplinary projects. Where many organizations have separate, siloed departments, SPRI thrives by integrating the unique strengths of each science area, providing a more complete perspective on orthopaedic and musculoskeletal scientific research.

"Our multidisciplinary approach to our science is what sets SPRI apart," says Johnny Huard, PhD, SPRI's Chief Scientific Officer and Director of CRPM. "Universities often have robust scientific departments and teams, but they don't often work outside of their own unique areas. Because of how we work at SPRI, we can seamlessly integrate biomotion and advanced imaging into our regenerative medicine clinical trials, and it's a differentiating layer to our science that you just don't find in other places."

Home to 26 physicians, The Steadman Clinic is the essential clinical arm of SPRI's research, much in the way SPRI is the essential research arm of the clinic. This relationship enables for a more efficient pathway of innovative, scientific discoveries into patient care, and it's made possible thanks to the surgeons and physicians who are drawn to practice at The Steadman Clinic. Research is a fundamental thread in the fabric of the organization, and physicians directly support SPRI, conduct research and work as faculty in SPRI's clinical fellowship programs.

"All of the physicians are connected by a passion for orthopaedics and sports medicine," shares Marc J. Philippon, MD, Chairman of SPRI and Managing Partner of The Steadman Clinic. "And we also are united in the

"Our multidisciplinary approach to our science is what sets SPRI apart. Universities often have robust scientific departments and teams, but they don't often work outside of their own unique areas. Because of how we work at SPRI, we can seamlessly integrate biomotion and advanced imaging into our regenerative medicine clinical trials, and it's a differentiating layer to our science that you just don't find in other places."

– JOHNNY HUARD, PHD,
SPRI'S CHIEF SCIENTIFIC OFFICER AND DIRECTOR OF CRPM

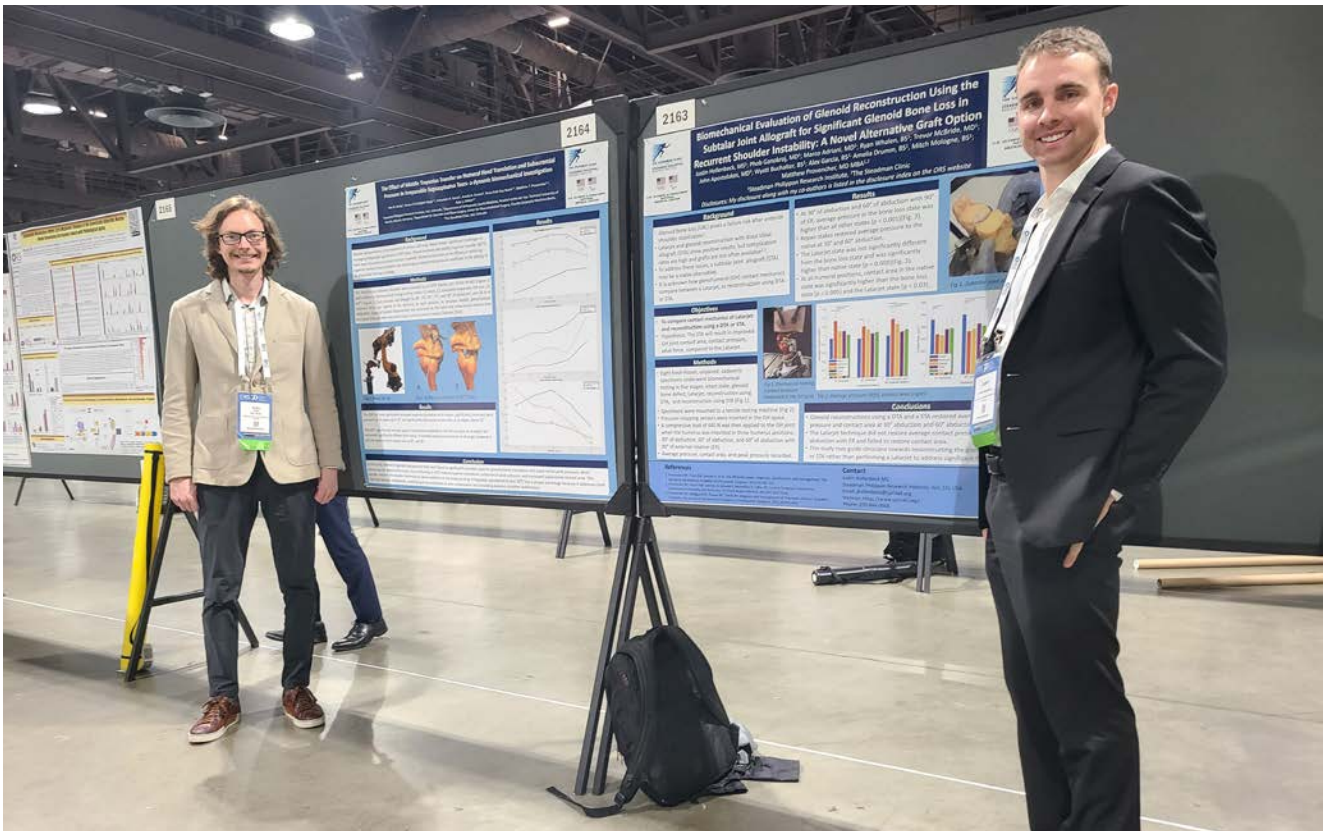
practice of evidence-based medicine—everything we do at the clinic is backed by research. We're conducting outcomes studies, investigating new therapies and techniques. We work together as clinicians, and as clinician-scientists. It's highly collaborative, and when we educate tomorrow's orthopaedic leaders in our fellowship programs, we're instilling the importance of practicing evidence-based medicine and participating in the science and advancement of our field."

DECADES OF GROWTH AT SPRI

J. Richard Steadman, MD founded The Steadman Clinic and the research organization now known as SPRI in Lake Tahoe in 1988. Dr. Steadman moved his practice and research institute to Colorado in 1990, beginning a legacy of sports medicine and orthopaedic research and care in Vail. Over the past 35 years, both organizations have grown significantly, from the recruitment of new physicians and expanded facilities to new SPRI research departments and scientists.

SPRI's original departments included clinical outcomes, biomedical engineering, imaging and education, which were located on the original first floor and basement level of Vail Valley Medical Center, now known as Vail Health. The Steadman Clinic was also distributed throughout the center, with physicians practicing on the second and third floors, and across the street in an adjacent building.

Drs. Marc J. Philippon and J. Richard Steadman photographed in Dr. Steadman's office in Vail



(TOP) The Steadman Clinic's Dr. Leslie B. Vidal conducts a surgical lab at the Vail Hip Symposium

(BOTTOM) Robotics Engineering Manager Alex Brady and Biomechanical Research Engineer Justin Hollenbeck present their research at the 2024 Orthopaedic Research Society (ORS) Annual Meeting

Dr. Johnny Huard presents at the 9th Annual Vail Scientific Summit

Over the next two years, The Steadman Clinic and SPRI moved into state-of-the-art facilities within Vail Health Hospital, including a brand-new Biomotion Laboratory—one of the most advanced labs of its kind in the world—and a cutting-edge regenerative medicine laboratory on the first floor. A significant advancement included a fourth-floor addition to the hospital, housing The Steadman Clinic's entire Vail team and SPRI's Surgical Skills and Robotics Laboratories. This expansion not only provided the team and patients with innovative equipment and facilities, but also embodied the organizations' synergistic missions—physicians could walk down the hall and be immersed in SPRI's biomechanics labs; collaborations accelerated organically and regularly.

In 2015, SPRI began a groundbreaking, 10-year collaborative partnership with Vail Health, supporting SPRI's expansion into regenerative and translational science and advancing SPRI's research facilities. This partnership has been integral to SPRI's scientific success over the past ten years, and was recently extended for an additional five years, through 2030.

A NEW DECADE OF INNOVATION AT SPRI

With new leadership, partnerships, advanced laboratories and an invigorated team, SPRI began a new decade of innovative science, including launching the regenerative medicine program, securing major federal funding awards and beginning the organization's first clinical trials. A firm foundation in team science and the symbiotic relationship with The Steadman Clinic positioned SPRI to expand its science and make a tremendous impact on musculoskeletal research and orthopaedic patient care.

SPRI MAKES A GLOBAL IMPACT

SPRI AND THE STEADMAN CLINIC PARTNER WITH U.S. OLYMPIC & PARALYMPIC COMMITTEE

In 2014, The Steadman Clinic and Steadman Philippon Research Institute were designated as a National Medical Center within the United States Olympic & Paralympic Committee (USOPC) National Medical Network, one of only three centers nationwide to hold this distinction. The Steadman Clinic's status as a National Medical Center continues through the 2028 Summer Olympic and Paralympic Games in Los Angeles, California.

Since this designation and partnership with the USOPC, The Steadman Clinic has treated nearly 700 Team USA athletes, including 89 who have gone on to medal victories following treatment, alongside athletes from many other Olympic competing nations. The Steadman Clinic's Managing Partner Dr. Marc J. Philippon alone has treated more than 150 Olympic and Paralympic athletes from 31 unique sports, representing 11 different nations.

In conjunction with the National Medical Center designation, SPRI entered a research partnership with the USOPC and the University of Utah, founding the U.S. Coalition for the Prevention of Illness and Injury in Sport. The coalition is a collaborative research effort committed to supporting injury prevention research efforts, which are focused on protecting the health of Olympians and Paralympians.

SPRI has co-hosted eight Injury Prevention Symposiums with the USOPC, gathering world leaders to share insights about athlete health, injury surveillance & prevention and safely returning athletes to their sport.

A HISTORIC DESIGNATION FOR SPRI FROM THE INTERNATIONAL OLYMPIC COMMITTEE

In 2017, SPRI and its U.S. Coalition partners were selected by the International Olympic Committee (IOC) to represent the United States as a partner in research for the prevention of injury and protection of athlete health. This was the first time in history the United States was represented as a Research Centre of Excellence within the IOC, joining only 10 other nations with this distinction. Just 5% of Olympic nations are represented in these research centers, further demonstrating the significance of this honor. The 11 centers are committed to researching, developing and implementing effective preventative and treatment methods for sports-related injuries and illnesses.

In recognition of the U.S. Coalition's demonstration of scientific, clinical and educational expertise in sport and exercise medicine, the IOC formally extended the IOC Medical Research Network designation for the U.S. Coalition through the next Olympic Cycle (2023–2026). This included taking care of Team USA in advance and following the 2024 Summer Olympic and Paralympic Games in Paris, where Dr. Philippon served onsite as a team physician. The Steadman Clinic and SPRI's partnership continues with the upcoming 2026 Winter Olympic and Paralympic Games in Milan and Cortina d'Ampezzo, Italy.

OLYMPIC SPIRIT DEFINES USOPC AND IOC PARTNERSHIPS

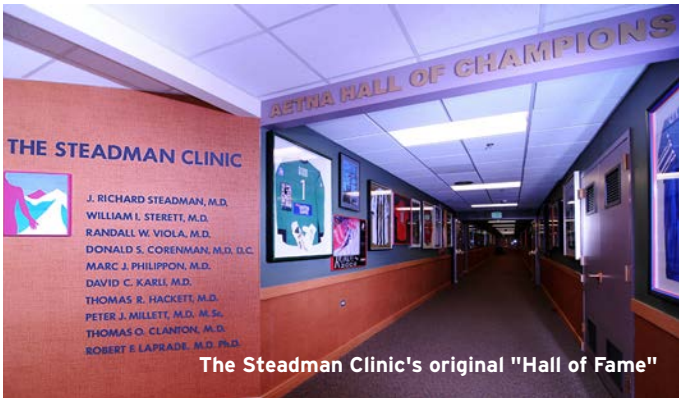
The focus of the U.S. Coalition and the IOC centers around the protection of athlete health—and that extends to all athletes, regardless of nationality. The sharing of research findings is an essential element of the IOC Medical Research Network, and participating research centers collaborate to ensure discoveries are implemented on a global scale. The international research collaboration embodies the Olympic spirit, which emphasizes participation, effort and respect, versus a sole focus on winning. With research, that means that discoveries made by one country are shared to benefit all athletes.

In October 2024, the IOC held its annual Research Centre's Meeting at the USOPC headquarters in Colorado Springs, Colorado, marking the first time the meeting was held in North America. During this closed-door meeting, delegates shared their latest findings and research progress over the past year. Following the IOC meeting, delegates traveled to Vail to participate in the 8th Annual Injury Prevention Symposium, which included research presentations, discussions and tours of the state-of-the-art laboratories at the SPRI campus.

As a collaborative institution with international reach, SPRI is committed to the Olympic spirit and making a global impact for the athletes of today and the athletes of tomorrow.

Original Biomotion Laboratory

Original Robotics Laboratory



The Steadman Clinic's original "Hall of Fame"

Original Surgical Skills Laboratory

Original Center for Regenerative Sports Medicine Laboratory

SPRI's Robotics Laboratory

The Steadman Clinic's "Hall of Fame"

The recently renovated Surgical Skills Laboratory, co-located with Robotics and The Steadman Clinic on the fourth floor of Vail Health Hospital

The state-of-the-art Linda & Mitch Hart Center for Regenerative and Personalized Medicine

The Biomotion Laboratory, now known as the Donna Giordano & Family Center for Biomotion Research

OVER THE PAST DECADE, SPRI HAS MADE SIGNIFICANT SCIENTIFIC ADVANCEMENTS AND ELEVATED ITS RESEARCH. THIS PROGRESS IS HIGHLIGHTED HERE, IN PUBLICATIONS, AWARDS AND OUTCOMES.

A DECADE OF HIGH-IMPACT PUBLICATIONS

- 1,157 SPRI Publications in PubMed, 2015–2024
- #1 in joint preservation and orthopaedic sports medicine: Over the past decade, SPRI published more papers in the top 1% of cited publications than any other organization
  - The journals analyzed included the *American Journal of Sports Medicine* (AJSM), *Orthopaedic Journal of Sports Medicine* (OJSM), *Knee Surgery, Sports Traumatology, Arthroscopy* (KSSTA), *Journal of Shoulder and Elbow Surgery* (JSES), *Journal of Hip Preservation Surgery* (JHPS), and *Arthroscopy*
- Most publications per capita by surgeon in high-impact orthopaedic and sports medicine publications *(Journal of the American Academy of Orthopaedic Surgeons,* 2018)
- SPRI Chairman Dr. Marc J. Philippon: writer of the most influential hip arthroscopy paper of all time and 6 of the top 10 most influential papers in hip arthroscopy *(Arthroscopy,* 2020)
- SPRI has published more of the top 100 most-cited research articles in arthroscopic surgery than any other institution worldwide *(Arthroscopy,* 2021)

(TOP) Dr. Johnny Huard received the Kappa Delta Ann Doner Vaughn Award in 2018

(BOTTOM) Dr. Marc J. Philippon was awarded the 2023 Orthopaedic Research and Education Foundation (OREF) Clinical Research Award

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10 YEARS OF MAJOR AWARDS

SINCE 2015, SPRI HAS BEEN AWARDED 19 MAJOR ORTHOPAEDIC AND SPORTS MEDICINE AWARDS

THESE AWARDS INCLUDE:

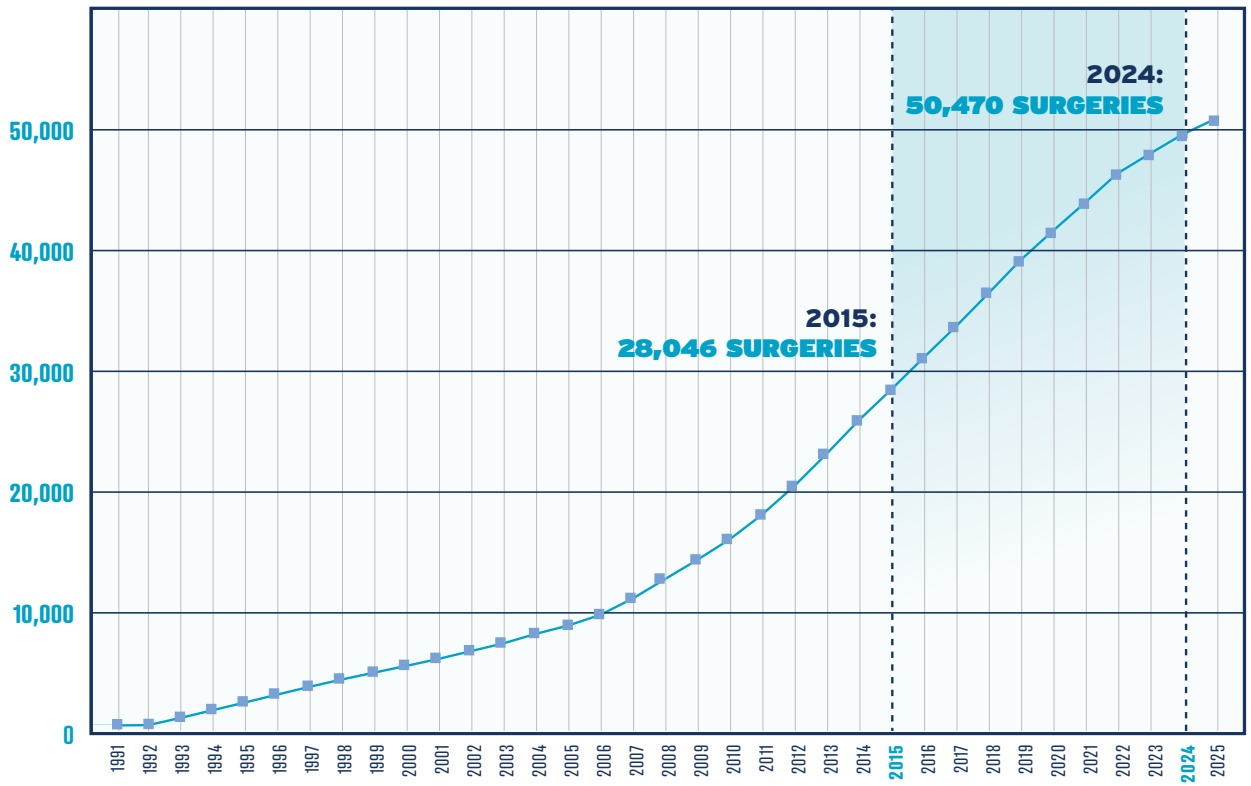
- **OREF Clinical Research Award** (2023)
- **Orthoregeneration Network (ON) Foundation/AGA Award** (2023)
- **AOSSM Fellow Research Award for Basic Science** (2022, 2019, 2018)
- **AOSSM Fellow Research Award for Clinical Science** (2020)
- **AOSSM Cabaud Memorial Award** (2019, 2018, 2017)
- **Arthroscopy Best Resident/Fellow Research Award** (2019)
- **Kappa Delta Ann Doner Vaughn Award** (2018)
- **AOSSM American Journal of Sports Medicine Systematic Review Award** (2018)
- **AOSSM William A. Grana Award for Best Original Research** (2018)
- **AAOS Best Science Paper Award** (2017)
- **ISAKOS Achilles Sports Medicine Research Award** (2017, 2015)
- **AOSSM Excellence in Research Award** (2016)
- **ESSKA The Nicola's Foundation Young Research Award** (2016)
- **ESSKA Basic Scientist Travel Grant Award** (2016)

GROWTH IN OUTCOMES

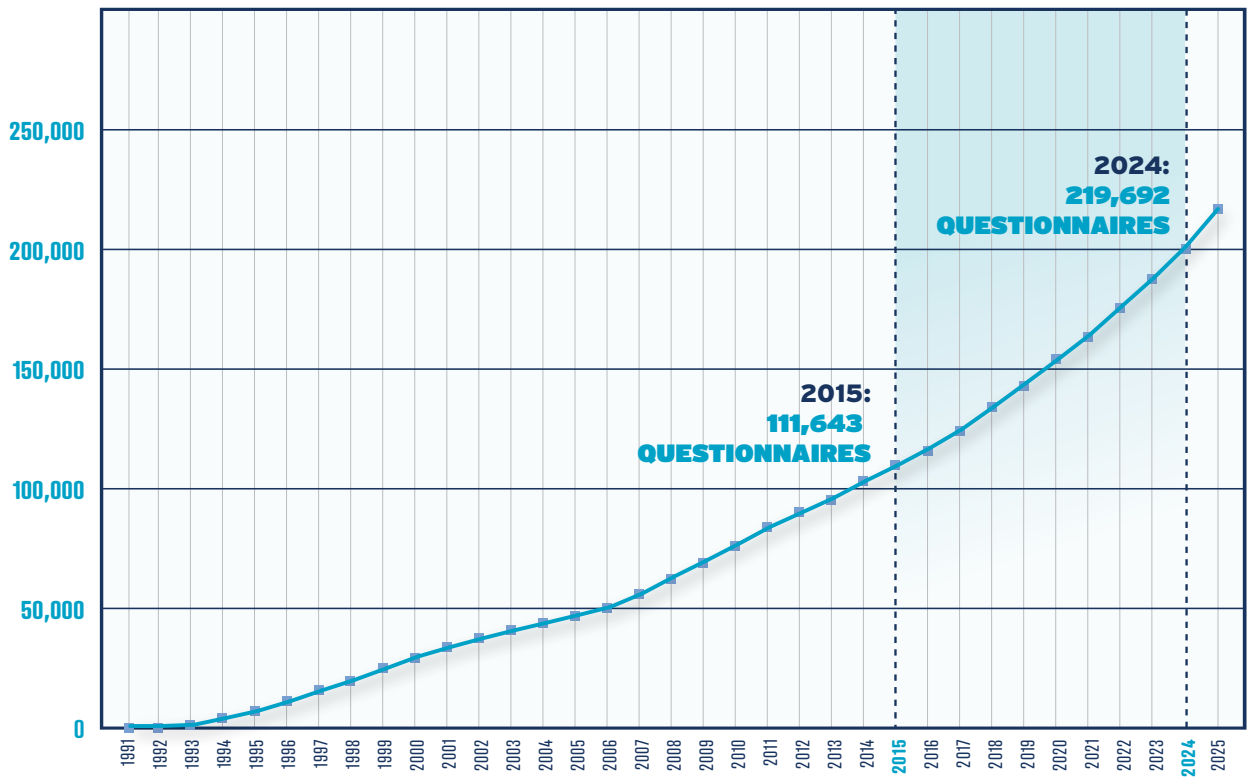
THE CENTER FOR OUTCOMES-BASED ORTHOPAEDIC RESEARCH has been tracking orthopaedic outcomes for 35 years. Over the past decade, SPRI's outcomes database has shown significant growth:

- An increase of 22,424 surgeries being tracked, up 80% since 2015
- An increase of 108,049 patient surveys recorded, up 97% since 2015

NUMBER OF SURGERIES TRACKED



NUMBER OF SUBJECTIVE PATIENT QUESTIONNAIRES CAPTURED



*REGENERATIVE MEDICINE TEAM MARKS **10 YEARS OF SCIENCE** AT SPRI*

THE STORY OF HOW STEADMAN PHILIPPON RESEARCH INSTITUTE LAUNCHED ITS REGENERATIVE MEDICINE RESEARCH PROGRAM DOES NOT BEGIN IN VAIL, COLORADO, AS ONE MIGHT EXPECT.

INSTEAD, THE ORIGIN STORY BEGINS ABOUT 1,500 MILES EAST, IN PITTSBURGH, PENNSYLVANIA.

THE ROAD TO VAIL, COLORADO

SPRI Chairman Marc J. Philippon, MD had spent several years of his career at the University of Pittsburgh Medical Center (UPMC), where he served as Director of Sports Medicine/Hip Disorders, Director of Sports Medicine/Hip Disorders Fellowship and Director of the UPMC Golf Medicine Program. Dr. Philippon joined The Steadman Clinic and SPRI in 2005.

Dr. Philippon's time at UPMC solidified connections that would become essential to The Steadman Clinic and SPRI—Dan Drawbaugh, former Chief Information Officer at UPMC, joined the organizations as CEO in 2015. And in 2015 when Dr. Philippon and Drawbaugh were considering expanding SPRI's research to include regenerative medicine, their first call was to Dr. Johnny Huard. Dr. Huard had spent 20 years at the University of Pittsburgh and UPMC, including appointments as the Henry J. Mankin Endowed Chair in the Department of Orthopaedic Surgery and the Director of the Stem Cell Research Center (SCRC). That first call was not initially a direct recruitment call, as Dr. Philippon and Drawbaugh were looking for recommendations from Dr. Huard—was there a scientist in his network who'd be interested in launching the program and moving to Vail?

Dr. Huard, who'd just accepted an appointment to join the team at the University of Texas Health Science Center (UTHealth), realized quickly that *he* was interested in joining the team at SPRI in Vail. In 2015, Dr. Huard accepted a shared appointment, spending half of his time in Vail as Chief Scientific Officer and Director of the Center for

CEO Dan Drawbaugh, Chief Scientific Officer Dr. Johnny Huard and Chairman Dr. Marc J. Philippon

Regenerative Sports Medicine—now known as the Linda & Mitch Hart Center for Regenerative and Personalized Medicine (CRPM)—and half of his time in Houston as Professor and Distinguished Chair in Orthopaedic Research in the Department of Orthopaedic Surgery at UTHealth. In 2019, Dr. Huard joined the SPRI team on a full-time basis.

NEW SCIENCE, SAME MISSION

Dr. Huard's arrival to SPRI in 2015 not only included a new department for SPRI, but also a new laboratory and team of researchers. Initially on the basement level of the hospital, a brand-new laboratory and SPRI offices were launched in 2016, right across the hall from SPRI's state-of-the-art Biomotion Lab.

Although the regenerative medicine department was new, the science and research conducted was a further fulfillment of the institute's mission and goals. Regenerative medicine—a branch of translational research focused on repairing or replacing damaged tissues using the body's own cells, biological materials or therapeutic agents—is a prominent field within orthopaedic research. In orthopaedics and sports medicine, regenerative medicine aims to promote healing in bones, joints, muscles, tendons and ligaments, both in case of injury or musculoskeletal diseases. The field embraces

the medical philosophy of the body healing itself, often using the body's own cells as a baseline from which to develop biologic treatments and therapeutics. And where many conventional medical treatments address disease symptoms, regenerative medicine is focused on addressing the root causes—ultimately seeking to cure, prevent, or significantly reduce the impact of diseases through therapeutic intervention.

As a translational field, regenerative medicine is emblematic of SPRI's bench-to-bedside research philosophy—the treatments and therapies discovered through scientific research will be translated to patient care, enhancing health and well-being on a global scale.

ADVANCING REGENERATIVE MEDICINE SCIENCE AT SPRI

Since its founding in 2015, CRPM has made a significant impact at SPRI. Dr. Huard and the team established the Vail Scientific Summit, an international scientific conference that hosts the world's leaders in regenerative medicine and healthy aging research. CRPM also established several important scientific research networks, including key collaborators from renowned organizations including Mayo Clinic, Northwestern University and University of Wisconsin (Shannon Network); The Buck Institute and University of California, San Francisco (Read Network); University of Miami;

Dr. Marc J. Philippon and Dr. Johnny Huard welcome guests to the first Vail Scientific Summit in 2015

Colorado State University and others. A major initiative of SPRI's CRPM included the establishment of the Healthy Aging Program, which channels orthopaedics through the lens of aging—musculoskeletal disorders and diseases like osteoarthritis are age-related diseases, and exploring these conditions in the context of aging helped to not only consider new therapeutic approaches for these diseases, but also helped to broaden CRPM's reach to new applications, including cancer, neurodegeneration and mental health. A goal of the healthy aging program is to help patients—across diseases and disorders—age better through regenerative medicine applications.

2018 was a significant year for CRPM. Dr. Johnny Huard was honored to receive the Kappa Delta Ann Doner Vaughn Award, signifying a lifetime achievement award in the field of orthopaedic research. The department also led SPRI to securing its first two federal funding awards from the National Institutes of Health (NIH) in 2018, representing the institute's first federal awards in its history. New federal funding accelerated in 2019, including three NIH primary awards, two subawards, and a multi-year contract with the Department of Defense (DoD), launching the institute's first federally funded, FDA-approved clinical trials in partnership with The Steadman Clinic. In 2020, SPRI received additional federal awards, including the Regenerative Medicine Innovation Project (RMIP) from the NIH, a five-year clinical trial including a philanthropic match, and a new DoD contract. The institute maintained this momentum, continuing to earn federal awards each year and investigate translational regenerative medicine through innovative clinical trials.

In partnership with the other teams at SPRI and the physicians at The Steadman Clinic, SPRI is currently underway on seven clinical trials, furthering the institute's mission to translate cutting-edge treatments and therapies to patients.

SPRI's First Expansion

In 2022, SPRI oversaw its first expansion, opening a regenerative medicine laboratory in the Aspen region, co-located in The Steadman Clinic, Basalt. In partnership with the Vail CRPM lab, the Basalt lab supports SPRI's clinical trial efforts and conducts biologics studies for the healthy aging program including new research into exosomes as a biologic therapy.

TRAINING TOMORROW'S ORTHOPAEDIC RESEARCH LEADERS

Education is a core element of SPRI's mission, from youth education programs for local Colorado students to world-renowned clinical fellowships for orthopaedic surgeons who have completed their surgical residencies. In addition to these programs, SPRI also hosts international scholars in research fellowships and employs research assistants across its departments, many of whom are completing a research year during medical school or before joining PhD programs. In this story, we'll share how three research assistantship programs at SPRI—outcomes, robotics and regenerative medicine—have alumni who have reached top medical schools, residency programs and other milestones.

Co-Director of the SPRI Sports Medicine Fellowship Dr. Matthew T. Provencher conducts a surgical demonstration in the Surgical Skills Laboratory

COOR RESEARCH ASSISTANTS MAKE MARK

Over the past decade, SPRI's Center for Outcomes-Based Orthopaedic Research (COOR) has hosted 50 research assistants who have made a significant impact on SPRI's outcomes research. A highly competitive research assistantship, many COOR researchers joined SPRI from top universities and medical schools before completing their research year. After completing their research assistantships at SPRI, alumni have joined top programs around the country, bringing a year of evidence-based medicine research with them.

MEDICAL SCHOOLS

- Harvard University
- University of Cambridge (UK)
- Brown University
- Dartmouth University
- Boston University
- Washington University in St. Louis
- Georgetown University (multiple)
- University of Colorado (multiple)
- Rutgers University
- University of Miami (multiple)
- Wakeforest University
- University of South Carolina
- University of Washington
- University of Chicago
- University of Minnesota
- Louisiana State University
- *And more*

POST-SPRI MEDICAL RESIDENCY PROGRAMS

ORTHOPAEDICS

- Mayo Clinic
- Hospital for Special Surgery
- Rush
- Stanford University
- University of Colorado (multiple)
- Johns Hopkins University
- University of Minnesota (multiple)
- University of Miami (multiple)
- University of Michigan
- Cleveland Clinic
- Emory University
- University of California, Davis
- The Ohio State University
- University of North Dakota
- Seton Hall University
- University of Texas
- *And others*

Drs. Peter J. Millett and Joseph J. Ruzbarsky in the operating room. Dr. Ruzbarsky graduated from the Sports Medicine Fellowship in 2020 and Hip Preservation & Reconstruction Fellowship in 2021 and is now a surgeon at The Steadman Clinic's Aspen and Basalt clinics

POST-SPRI MEDICAL RESIDENCY PROGRAMS (CONT.)

OTHER RESIDENCIES

- Stanford University (Internal Medicine)
- Rush (Emergency Medicine)
- University of Utah (Ophthalmology; Radiology)
- Ochsner Health (Radiology)
- Prisma Health (Pediatrics)
- *And others*

OTHER POST-SPRI CAREER PATHS, ACCOMPLISHMENTS & ACCOLADES

- Forbes 30 Under 30
- Fulbright Scholarship
- Olympic Ski Coach
- Clinical Research at Memorial Sloan Kettering Cancer Center
- Research at Hospital for Special Surgery
- Research at Duke University
- Research at Georgetown University
- Operations at REDCap
- Steadman Philippon Research Institute Sports Medicine Fellowship

Former Robotics Research Assistant Amelia Drumm provides a demonstration to Keystone Science School students; Amelia completed her research assistantship while in medical school at University of Colorado and recently matched with Washington University in St. Louis for her Orthopaedic Surgery Residency

ROBOTICS RESEARCH ASSISTANTS ATTEND TOP MEDICAL SCHOOLS AND RESIDENCIES

SPRI's Robotics Program, a laboratory within the Department of Biomedical Engineering (BME), conducts biomechanics studies that investigate surgical techniques, injury pathologies and more. BME Research Assistants often join SPRI during medical school, completing a year of research before returning to their programs. Other researchers complete a year of research before joining their surgical residency programs. These top-level programs include:

- University of Colorado
- Mayo Clinic
- Duke University School of Medicine
- Johns Hopkins University
- Boston Children's Hospital/Harvard Medical School
- University of Minnesota
- Washington University in St. Louis
- Stanford Orthopaedics & Sports Medicine
- Stonybrook Medical School
- Cedars-Sinai Kerlan-Jobe Orthopaedic Clinic
- Kaiser Permanente Oakland Medical Center
- Sanford Health
- SUNY Upstate
- *And others*

CRPM RESEARCH ASSISTANTS CONTINUE MEDICAL AND SCIENTIFIC CAREERS

Many researchers begin their scientific careers as Research Assistants in SPRI's Linda & Mitch Hart Center for Regenerative and Personalized Medicine (CRPM). Recent alumni have gone on to attend top medical schools and graduate programs including PhD candidacies. These include:

MEDICAL SCHOOLS

- University of Wisconsin
- University of Queensland
- Wake Forest University
- University of Miami
- University of Texas Southwestern

GRADUATE SCHOOLS:

- University of Utah
- Colorado State University
- Oregon Health & Science University
- Rush University
- Texas A&M University
- University of Colorado
- University of California San Francisco

PHYSICIAN ASSISTANT SCHOOL:

- Colorado Mesa University

CONTINUING A LEGACY OF EVIDENCE-BASED MEDICINE

In addition to these SPRI research assistants, nearly 100 orthopaedic surgeons have graduated from SPRI's elite clinical fellowships in the past ten years, and over 250 surgeons since the fellowship programs began. These surgeons have gone to be true orthopaedic leaders—many have gone on to practice at world-renowned clinics, lead as surgical chiefs and teach future surgeons and researchers. Alumni from all of SPRI's education programs leave with a common foundation—training in the research and practice of evidence-based medicine. It means that no matter where alumni go after their time at SPRI, they will continue to conduct research and build practices based on the important grounding of research, benefitting future patients all over the world.

SPRI's 2024 Clinical Fellows, photographed with attending faculty from The Steadman Clinic

Former SPRI Sports Medicine Fellows, now attending Faculty Drs. Peter J. Millett and Jonathan A. Godin attend fellows' research presentations

35% OF THE STEADMAN CLINIC'S TEAM COMPRISED OF FELLOWSHIP ALUMNI

For decades, SPRI's Accreditation Council for Graduate Medical Education (ACGME)-accredited Sports Medicine Program has been a leader in sports medicine training programs in the United States. In fact, the program was named the #1 program by *Arthroscopy* in 2023. Alumni join top practices all over the country, including several physicians who have returned to The Steadman Clinic after their SPRI fellowships. Seven of these nine alumni surgeons have joined The Steadman Clinic in the past ten years.

THE STEADMAN CLINIC'S FELLOWSHIP ALUMNI:

- **Randall W. Viola, MD,** Sports Medicine Fellowship
- **Peter J. Millett, MD, MSc,** Sports Medicine Fellowship
- **C. Thomas Haytmanek, Jr, MD,** Foot and Ankle Fellowship
- **Jonathan A. Godin, MBA, MD,** Sports Medicine Fellowship
- **Jared T. Lee, MD,** Sports Medicine Fellowship
- **Joseph J. Ruzbarsky, MD,** Sports Medicine Fellowship and Hip Preservation & Reconstruction Fellowship
- **Sonny S. Gill, MD,** Sports Medicine Fellowship
- **Jonathon D. Backus,** Foot and Ankle Fellowship
- **Ali S. Noorzad, MD,** Sports Medicine Fellowship and Hip Preservation & Reconstruction Fellowship

Each year, SPRI's EPOC welcomes Colorado students into an immersive STEM experience

OVER A DECADE OF EDUCATING LOCAL YOUTH

In addition to training researchers, scientists and surgeons, SPRI provides STEM education to Colorado youth through its Education and Public Outreach Committee (EPOC). The program has served over 4,000 students in hands-on programs, including laboratory tours for fifth graders, middle school visits and immersive programming for high school students: surgical skills labs, career shadowing opportunities and the year-long Science Club and the SPRI Summer Scholars Program—a week-long STEM course at SPRI's campus. These high school programs have recently expanded to the Steadman Philippon Orthopaedic Center in Basalt, further broadening the reach of these programs. EPOC's programming also includes a collaboration with Keystone Science School's Girls in STEM program, welcoming students in grades 4–8 to experiment in SPRI's labs.

The goal of SPRI's EPOC has always been to provide unique STEM experiences to Colorado students, helping to ignite a spark in science and medicine in young people. Participating students are able to see, firsthand, what a career in science and medicine might look like, and many alumni have gone on to pursue college concentrations and careers in STEM fields. Several students have even returned to SPRI to work as research assistants or as full-time employees at The Steadman Clinic, continuing their passion for STEM, right at home.

For more than a decade, SPRI has provided STEM immersion for Colorado youth, encouraging future researchers, scientists, engineers, physicians and more.

A DECADE OF CLINICAL IMPACT

AS THE RESEARCH ARM OF THE STEADMAN CLINIC, SPRI IS COMMITTED TO SUPPORTING THE CLINIC THROUGH OUTCOMES RESEARCH, CLINICAL TRIALS AND RESEARCH PROJECTS THAT SUPPORT THE ADVANCEMENT OF ORTHOPAEDICS AND SPORTS MEDICINE TREATMENTS, TECHNIQUES AND PATIENT CARE. TO HELP ILLUSTRATE HOW SPRI HAS MADE A CLINICAL IMPACT OVER THE PAST DECADE, WE ASKED THE STEADMAN CLINIC PHYSICIANS WHO HAVE SEEN THIS TRANSFORMATIVE DECADE OF RESEARCH AT SPRI, FROM 2015 TO TODAY.

Steadman Philippon Research Institute (SPRI) and The Steadman Clinic are the true fulfillment of a mission driven by evidence-based medicine. Throughout my career, I've been focused on not only practicing the most innovative procedures to improve my patients' lives, but I've also committed to conducting the vital research that supports my clinical practice. Over the past decade, it's been incredible to see SPRI's growth and the breadth of research our institute conducts every day.

"In 2023, I was honored to receive the Orthopaedic Research and Education Foundation (OREF) Clinical Research Award, an award that recognized my career in clinical research, encompassing clinical outcomes, biomechanics, regenerative & personalized medicine and biomotion & imaging research on the hip. Just last year in 2024, *The Journal of Bone & Joint Surgery* (JBJS) published a SPRI comparative study of labral repair and labral reconstruction indicating that in two-year outcomes of primary arthroscopic surgery for Femoroacetabular Impingement (FAI), patients who received primary labral repair had better reported outcomes than those who had primary labral reconstruction. This research is valuable for me as a clinician-scientist, but also for the greater literature surrounding hip preservation and standard of care for other surgeons in the field.

"This recent example of clinical outcomes in hip arthroscopy echoes much of the work I've done at SPRI, including 10-year outcomes following hip arthroscopy for FAI, published in JBJS in 2017 and subsequent commentary in the Lancet, which formally validated the hip arthroscopy treatment for FAI. Where arthroscopy was once considered experimental, these outcomes indicate that in the correctly selected patient with FAI, hip arthroscopy provides the best outcome for the patient. This is an example of what research can do—develop a technique, test it biomechanically, validate it with outcomes. This cycle of innovation is made possible because of the unique, symbiotic relationship between SPRI and The Steadman Clinic."

MARC J. PHILIPPON, MD

“Dr. Steadman founded Steadman Philippon Research Institute with the intention of making it the global leader in orthopaedic knee research. Over the past decade, SPRI has grown into a global leader not only in orthopaedic knee research, but also in all orthopaedic subspecialties and regenerative medicine as well.

“With the support of the institute, I’ve been able to develop and validate innovative techniques for upper extremity internal fixation, nerve reconstruction, tendon stabilization and osteochondral allograft reconstruction. These advances have allowed numerous NFL, NBA, MLB, PGA, ATP, US Ski and Snowboard, Motocross and USOPC athletes to continue and advance their careers. SPRI has not only allowed me to validate these new techniques and use them for all patients at The Steadman Clinic, but also publish the results so that patients worldwide can benefit.

“A recent example is the biomechanical and clinical research currently underway on extensor carpi ulnaris tendon instability, a common problem for golfers. This research validates our new procedure; it has helped numerous PGA golfers return to top form.

“None of these advances would have been possible without the support of Steadman Philippon Research Institute and its dedicated researchers.”

RANDALL W. VIOLA, MD

"Steadman Philippon Research Institute has been a global leader in orthopaedic research since its inception with Dr. Steadman so many years ago. I've been very privileged to work side-by-side with clinicians, clinical scientists and engineers to assist in the development and refinement of our understanding of the human body.

"We've done extensive work on the management of Anterior Cruciate Ligament (ACL) injuries and associated knee pathologies. More recently, we have published on the outcomes of Anterior Cruciate Ligament reconstruction in older patients. Traditionally, even patients over the age of 40 were not considered ideal surgical candidates. Now we have—with the help of our clinical research team at SPRI—shown that ACL reconstruction surgery can be safely and effectively done in our more aging athletic population with successful outcomes on patients well into their 70s and beyond. We have been successful in sharing this information with the orthopaedic community in order to keep our patients active their entire lives.

"Additionally, in the biomechanics lab, we have been able to define the intricate details of the complex anatomy of the elbow through precise anatomical studies. This has led to more advancements in the development of elbow ligament repair over reconstruction. Our foundational anatomical studies are being used more and more each year to assist scientists and clinicians around the world on how to better stabilize medial elbow injuries. Without the extraordinary infrastructure of SPRI, these studies would not have been made possible."

THOMAS R. HACKETT, MD

"SPRI is an essential component of the care I provide to my patients at The Steadman Clinic. With our research teams in Biomedical Engineering (BME), we can validate new procedures. Through the Linda & Mitch Hart Center for Personalized and Regenerative Medicine (CRPM), we can study ways to accelerate and improve healing. Through the Center for Outcomes-based Orthopaedic Research (COOR), we track clinical outcomes so that I am able to know, with real evidence, not only that I am selecting the best possible treatment for each unique patient, but also that I have an accurate picture into their expected recovery. Through our educational mission, we share our research with other surgeons, both directly by teaching the next generation in our Fellowship programs, and also indirectly through surgical videos and publications on various conditions. As clinicians, we're able to provide a comprehensive approach to our patient care, backed by research.

"One example of the cycle of clinical translation in my research is investigating clinical outcomes following my inventions in rotator cuff repair. First validated in BME and improved with research from CRPM, my patients' rotator cuff surgical outcomes using these new techniques were investigated at two, five and ten years after surgery through COOR. Outcomes showed some of the best results ever reported for this common malady. This type of holistic research approach is vital for clinician-scientists like me because we are able to validate that our surgical techniques are effective and durable for our patients so they can live the active lives they want to, for years after their treatments.

"Over 20 years ago, and based on an idea first developed with insights from the work of Dr. Steadman in the knee and Dr. Philippon in the hip, I developed the Comprehensive Arthroscopic Management (CAM) procedure for the shoulder—a joint-preserving technique to treat active patients with glenohumeral osteoarthritis (GHOA). This approach was designed to help maintain patients' shoulder joints and delay or prevent altogether the need for total shoulder replacement. When we embarked on this work nearly two decades ago, there were few long-term outcomes studies investigating arthroscopic treatment of GHOA, and through diligence, focus, and persistence, our SPRI team was able to conduct a meaningful ten-year follow-up that proved that the CAM procedure was an effective joint-preserving treatment for GHOA in appropriately selected patients, with sustained positive outcomes at ten years. The global impact of this seminal work was supported recently during the American Academy of Orthopaedic Surgeons annual meeting in March 2025, where an independent group of several hundred surgeons from around the world overwhelmingly favored CAM as the preferred treatment strategy for the active patients with GHOA. The development and validation of techniques like the CAM procedure allow real, proven techniques to reach more patients and that is fundamental to our mission of 'keeping patients active.'"

PETER J. MILLETT, MD, MSC

In the past ten years, I've seen SPRI advance from conducting mostly outcomes and biomechanics studies to initiating major federally funded clinical trials involving biologic therapeutics. As an interventional pain physician, I view these clinical trials as an important pathway for me to investigate and understand the efficacy of biologics, as well as looking at ways we can further optimize these therapies for our patients. All of the physicians at The Steadman Clinic are united in providing safe and effective treatments for our patients, which are supported by scientific research. Collaborations with our scientists and researchers are hugely beneficial for our clinical practices.

"When I reflect on the past ten years and I look forward to what's next for SPRI, I see a further evolution of our research and how we can utilize our science to benefit our patients even further. We are going to look at the whole patient—not just isolated joints or the spine—investigating how integrating specific exercise programs like Pilates, a targeted focus on nutrition, etc. complete a picture of care, beyond surgical techniques and therapeutics. SPRI can help capture patient outcomes for these approaches, which will help inform a comprehensive, whole health view for how we treat and care for orthopaedic patients."

THOS A. EVANS, MD

"One of the things that drew me to The Steadman Clinic was the robust research capabilities of SPRI. Even after I retired at the end of 2020, I've had the privilege of remaining active in my research with SPRI, and it's been an honor to see the institute further evolve with its clinical trials and expanded capabilities.

"As the former director of the Foot & Ankle Fellowship Program, I had the pleasure of training many excellent young surgeons, including two who are now physicians at The Steadman Clinic and Co-Directors of the Foot & Ankle Fellowship—Drs. C. Thomas Haytmanek, Jr. and Jonathon D. Backus. Together, Drs. Haytmanek, Backus and I have conducted dozens of biomechanical projects on the foot and ankle, including developing new surgical techniques, comparing procedures and conducting outcomes studies reviewing the efficacy of these treatments. Three of these outcomes studies validated the best surgical approaches for Achilles tears, lateral ankle instability and unstable high ankle sprains. Together, Drs. Haytmanek, Backus and I have published 20 high-impact publications, and these accomplished surgeons are poised to further advance the field of foot and ankle sports medicine.

"SPRI has provided me—and my fellow clinician-scientists—a meaningful research support that allows The Steadman Clinic to constantly innovate and provide the latest, groundbreaking treatments and procedures to our patients. Knowing that my research-backed techniques continue on with the next generation of foot ankle surgeons is deeply rewarding as a physician, researcher and educator."

THOMAS O. CLANTON, MD, RET.

A DECADE OF GROWTH
A BRIGHT FUTURE FOR SPRI

From 2015–2024, SPRI's science made a tremendous impact, from major clinical innovations like implementing the surgical optimization protocol and advancing surgical techniques to cutting-edge regenerative medicine research centered around healthy aging and improving healing. Across SPRI's research areas—regenerative medicine, biomechanics, imaging and outcomes—the team has thrived as an organization committed to the practice of team science with a singular focus: improving patient care on a global scale.

WHAT'S NEXT FOR SPRI?

SPRI continues to advance its orthopaedic and musculoskeletal research through clinical trials, basic science and biomechanics projects.

- As the organization has grown, so has SPRI's focus areas—the institute collaborates with its partner Vail Health on cancer and behavioral health research. SPRI looks to continue these studies, focusing on a mind-body research program and partnering in the science behind whole-body health.
- SPRI's COOR is launching a brand-new database, harnessing next-generation tools including artificial intelligence platforms to accelerate its research capabilities, taking COOR's world-leading orthopaedic outcomes data to new heights.
- SPRI's CRPM has expanded into the study of extracellular vesicles, and the team plans to further this research with more clinical trials and development of enhanced therapeutic applications.
- New research directions include several studies into skeletal muscle tissue, an imperative link between healthy aging, healing and recovery. Studies include investigations into therapeutics and methodologies for improving muscle mass at the cellular level.

(TOP LEFT) State-of-the-art equipment in SPRI's renovated Surgical Skills Laboratory
(TOP RIGHT) SPRI created an obstacle course to replicate real-world conditions for a DoD-funded clinical study on return-to-duty protocols
(BOTTOM) Speakers and attendees at the 9th Annual Vail Scientific Summit in 2024

TEAM SCIENCE

SPRI's success is made possible not only by an incredible research team and passionate leaders, but also through vital partnerships, research networks, a scientific advisory board and an engaged board of directors. SPRI's research has long been championed by benefactors, many of whom have experienced world-class care from SPRI's physician partners at The Steadman Clinic. Powered by philanthropy, SPRI has been able to further expand its research into federal- and state-funded awards. SPRI's generous donors have even provided matching funds for major awards from the National Institutes of Health (NIH) and State of Colorado.

Team science at SPRI extends beyond the walls of its labs and offices—it includes every donor, collaborator, partner, board member, patient and research participant. SPRI's decade of impact would not be possible without this broad team, and its future success relies on this incredible network.

CONGRATULATIONS

TO THE ENTIRE

STEADMAN PHILIPPON RESEARCH INSTITUTE

TEAM ON A DECADE OF CUTTING-EDGE

SCIENCE AND RESEARCH!