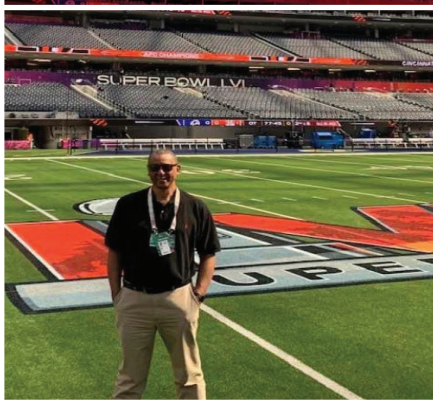

2022 ANNUAL REPORT

Internationally distinguished for patient care with compassion and advanced clinical research

Cincinnati SportsMedicine Research & Education Foundation

Cincinnati SportsMedicine & Orthopaedic Center — Mercy Health

Noyes Knee Institute

Welcome to our Foundation

The Cincinnati Sports Medicine Research and Education Foundation in collaboration with Graduate Medical Education at Jewish Hospital - Bon Secours Mercy Health administers and directs all our education and research programs. This 2022 Annual Report showcases the major advances of all Divisions within our organization. Collectively, this association has provided a most successful and productive year.

Over four decades, our staff have established and educated a world class team of orthopedic surgeons, physical therapists, athletic trainers, performance enhancement specialists and allied health professionals. These specialists are dedicated to our sports medicine and orthopedic patients in the entire spectrum of non- operative and operative treatment of patient musculoskeletal disorders, injuries, and arthritis to restore patients to an active healthy lifestyle and return to their athletic and occupational pursuits.

Our mission is to provide the most expert state-of-the art compassionate care to our patients utilizing the team approach of physicians, therapists, and athletic trainers. We have published the most advanced research on clinical outcomes for musculoskeletal injuries and disorders.

As a Foundation we have established educational programs and trained thousands of specialists world-wide. We wish to thank the surgical, clinical, rehabilitation, administrative staff, and allied medical personnel who have contributed to our Mission and made these advances possible.

Our research personnel and scientists have conducted over 120 clinical research studies involving thousands of patients, published over 375 articles in peer-reviewed medical journals and orthopedic textbooks. We have trained 169 sports medicine and arthroscopic surgeons who have active orthopaedic and sports medicine practices throughout the United States.

The Noyes Knee Institute was founded to advance the goals of long-term clinical outcome registry studies for knee ligament and other disorders. Now there are similar registry programs for shoulder and hip disorders, orthobiologics and sports medicine that are featured in this 2022 report.

The physicians associated with the Foundation strive, through research and clinical practice, to develop state-of-the art treatment options that represent the most advanced procedures available world-wide. Please see the Directors Report for our new surgeons that have joined and are faculty members for our Fellowship.

Foundation program, Sportsmetrics™, has received national and international recognition. Sportsmetrics™ is a scientifically proven, non-profit neuromuscular training program designed to prevent ACL injuries in female athletes and to provide the basis of objective tests for the safe return to athletics in both male and female athletes after injury and surgery.

Our Sportsmetrics™ staff teaches and certifies allied health professionals locally, nationally, and internationally to implement these programs in their communities.

Sportsmetrics™ is the largest sports injury prevention program at 1,530 sites world -wide and is described in detail in this report.

We were pleased to provide a live, in-person "Advances on the Knee, Shoulder, Hip, and Sports Medicine" meeting in Hilton Head over Memorial Day 2022. Our annual conference, featured in this report, has trained physicians, physical therapists, and athletic trainers world-wide. For 2023, we will be LIVE in Hilton Head for our 37th year!

Thanks everyone for a wonderful 2022 year!

We appreciate the expert faculty that support the excellence of our programs. The Foundation was founded in 1985 by Frank R. Noyes, MD, President and Medical Director of the Cincinnati SportsMedicine and Orthopedic Center. The Foundation was established with the goal of bringing together surgeons, therapists, athletic trainers, researchers, and bioengineering professionals in a team approach to develop successful and innovative treatment programs to improve the lives of patients.

The clinical and bioengineering research studies have received nearly every national and international award possible. These include the highest award from the American Academy of Orthopedic Surgeons (Three Kappa Delta Awards), the Orthopedic Research and Education Foundation's Clinical Research Award, and the American Orthopedic Society for Sports Medicine Clinical and Research Awards.

The Foundation's studies were recently honored and ranked in bibliographic publications in the Journal of Bone and Joint Surgery and the Arthroscopy Journal as the "Most-cited studies" in the world. This is unmatched by any other treatment or research facility world-wide.

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Our Mission

To improve the lives of patients everywhere by offering advanced and state-of-the-art treatments for Orthopaedic and Sports Medicine disorders based on excellence and success in documented clinical outcome studies and application of basic and clinical research.

2022 Accomplishments

"Retirement is not the end of the road. It is the beginning of the open highway."
–Author Unknown

2022 saw some major changes in our research, clinic and rehabilitation staff. Sue Barber-Westin, Tim Heckmann, and Donna McCloy have headed into retirement. We thank Sue, Tim, and Donna for their years of dedication and service.

Sue Barber-Westin, BS

Sue joined Cincinnati SportsMedicine Research and Education Foundation in 1985 and served as the director of clinical and applied research for over 30 years. In collaboration with Dr. Noyes and other Cincinnati SportsMedicine physicians, Sue's contribution to the knee orthopaedic medical literature is second to none.

Over the course of her career, Sue authored or co-authored 239 peer reviewed manuscripts and book chapters. In addition to her published work, Sue was the recipient (along with Drs. Noyes, Grood, and Butler) of the 2004 OREF Clinical Research Award. This award, presented by the Orthopaedic Research and Education Foundation and the American Academy of Orthopaedic Surgeons, recognizes the most distinguished clinical research project related to musculoskeletal disease or injury in the field of orthopaedics.

Tim Heckmann, PT, ATC

In 1981, fresh out of physical therapy school, Tim joined the rehabilitation department at Cincinnati SportsMedicine and Orthopaedic Center. Tim spent the majority of his career caring for Dr. Noyes' complex knee patients. Tim's devotion to his patients makes him an exceptional clinician.

In addition to providing compassionate and expert care to his patients, Tim has had a successful research career. He has authored or co-authored over 32 peer reviewed manuscripts and textbook chapters. Tim has also presented on various knee related topics at regional, national, and international meetings.

Donna McCloy

The queen of the clinic, Donna helped run the day-to-day operations of Dr. Noyes' busy complex knee and sports medicine clinic. Donna joined the team at Cincinnati SportsMedicine and Orthopaedic Center in 1993 and spent the next 29 years assisting Dr. Noyes in the care of his patients.

Donna was the face of Dr. Noyes' clinic. She worked tirelessly to make sure that all patients were cared for, surgeries scheduled, forms completed, and questions answered. Donna's compassion and dedication to Dr. Noyes' patients will be missed.

We thank Sue, Tim, and Donna for their years of leadership, loyalty, service, dedication and exemplifying a world class reputation for making a difference in the orthopaedic community. Best wishes as these three wonderful people head onto new adventures.

Dr. Frank Noyes was honored at the 2022 Jewish Gala event for his care to the patients of the Jewish Hospital.

Dr. Marc Galloway was named the 2022 Ohio Athletic Trainers' Association Team Physician of the Year.

Dr. Frank Noyes was inducted into the Milford Athletic Department Hall of Fame for his 35 years of dedicated service and support.

Education

- Physicians gave over 51 virtual and in-person presentations to the international, national, regional, and local orthopaedic communities.
- 60 virtual teaching conferences attended by fellows, physical therapists, athletic trainers, and physical therapy students.
- 12 virtual journal clubs attended by staff physicians and fellows.
- Quarterly morbidity and mortality conferences attended by staff physicians and fellows.

Fellowship

- Nationally acclaimed sports medicine, knee, and shoulder fellowship program.
- Under the direction of Dr. Hasan, the Cincinnati Shoulder and Elbow Fellowship graduated its 3rd fellow and welcomed a new fellow for 2022-2023 academic year.
- ACGME/RRC accreditation; recognized by the American Orthopaedic Society for Sports Medicine and the Arthroscopy Association of North America.
- 169 fellow graduates (1979-2022) practicing across the United States and Canada.
- Expansion of faculty to include Dr. Michael Laidlaw

Sportsmetrics™

- Greater than 130 athletes trained in 2022. Many of these sessions were conducted virtually.
- Certification: 100 individuals were certified. This was completed through virtual and in-person courses. The virtual platform allowed for the continuation of a hands-on learning environment.
- Returned to live, in-person certification courses

Director Statements

Frank R. Noyes, MD, *Medical Director*

The clinical and research initiatives for providing comprehensive state-of-the art orthopaedic care for our patients continued in 2022. The major accomplishments in every Division are highlighted in this Annual Report. The enthusiasm and excellence of our physicians, rehabilitation, athletic trainer staff, administrative, and research staff are outstanding. The compassionate care provided to thousands of patients over 2022 is a major achievement and our patients acknowledge this care with exceptional high grades and personal tributes. I thoroughly enjoy working together month-after-month in this productive patient care, research, and teaching environment.

We are now in our nineth year of integration of Cincinnati Sports Medicine and Orthopedic Center and our Research and Education Foundation with Bon Secours Mercy Health, one of the largest healthcare systems in the United States. We are pleased to be integrated with the Graduate Medical Education Program at the Jewish Hospital — Cincinnati for our nationally recognized ACGME Sports Medicine and Arthroscopic Surgery Fellowship. In addition, there are many active IRB clinical research outcome studies and educational programs. The Cincinnati Shoulder and Elbow Fellowship, under the co-direction of Dr. Samer Hasan continues to be highly successful with multiple applications for training. In addition, Dr. Hasan continued as the Regional Medical Director and Chair of the Orthopedic and Sports Medicine Service Line, Mercy Health Cincinnati. The Shoulder Division had a highly successful year with new and continued clinical studies that are showcased in this report.

In December 2022, we celebrated the one-year anniversary of our new facility that houses the outpatient clinic, rehabilitation facilities, research and education offices. This facility occupies over 20,000 square feet in a beautifully appointed outpatient building on the Jewish Hospital Kenwood Campus, adjacent to other outpatient buildings and the Hospital complex. The physician outpatient clinic includes 10 physicians and their entire clinical staff providing care for multiple orthopaedic disorders of the knee, shoulder, hip, hand, foot/ankle, and back. The physical therapy department is over 7,500 square feet with 10 full time physical therapists and includes a team of assistants and athletic trainers. In addition, there is a human performance laboratory with sophisticated equipment such as an Alter-G anti-gravity treadmill, force plate, video-analysis, Bod Pod for body fat/muscle analysis, and Vo2 max measurements. The goal is to provide the most comprehensive objective testing of our athletic population on their return to athletic activities after our treatment of sports-related injuries.

In 2022, we gathered at a special function to honor our esteemed orthopaedic colleague Thomas Lindenfeld, MD who retired from active practice after 37 years. Dr. Lindenfeld was known for his genuine friendship and soft heart for our staff and fellowship surgeons. He was known for the superb care he provided for his patients, knowledge, excellence of his surgical skills, and the scientific methods he used in the analysis. Dr Lindenfeld was a mentor and educator for 37 years from 1984 to 2021.

A special recognition to our newly appointed faculty as our former CSMOC fellow, Dr. Andrew Kalthoff joined our sports medicine fellowship faculty. Dr. Kalthoff specializes in orthopedic surgery with interests in knee, shoulder, and total joints. He is located on the east side of Cincinnati. In addition, Dr. Mahmoud Almasri continues in his second year as the Director of Hip Preservation. Dr Almasri completed our fellowship in 2020 and after a second fellowship at McMasters University in Canada returned to our clinical and research faculty. I also wish to welcome Dr. Michael Laidlaw as our newest faculty member. Dr. Laidlaw completed his fellowship at the University of Virginia after serving in the US Air Force for several years and specializes in all aspects of sports medicine including shoulder and knee instabilities and patellofemoral abnormalities. We are delighted to have him join our faculty.

In 2022 we held an in-person Hilton Head meeting entitled "Advances on the Knee, Shoulder, Hip and Sports Medicine" that was well attended by surgeons, therapists, athletic trainers, and physician assistants from throughout the United States. A special recognition and thanks to a superb faculty from many different institutions and of course our Cincinnati Sports Medicine faculty and fellows. We are currently in the final stages of planning for the 2023 Hilton Head course.

In 2022 we continued with a robust Sportsmetrics™ certification program that was conducted in both virtual and in-person settings throughout the year. In addition to neuromuscular certification for training female and male athletes, a second emphasis of the program provides the training and education on return to sports objective tests that are so important to implement in the care of injured athletes.

I wish to provide a special recognition to the orthopedic surgeons and athletic trainers that provide a robust sports medicine program for multiple high schools, colleges, and professional teams. A special recognition to Dr. Marc Galloway on his 15 years as Head Team Physician for the Cincinnati Bengals and as Director of the Mercy Health Sports Medicine Committee. A special recognition to Dr. Matthew Busam for his work as Chief Medical Officer for FC Cincinnati professional soccer with MLS. A special recognition to Dr. Brian Chilelli appointed as the head orthopedic team physician for Miami University in Oxford, Ohio. Working as the head team physician at the collegiate and professional level represents an extraordinary commitment. These team physicians provide a robust and unique educational training for our fellowship.

Our Center continues to offer sports medicine and specialty clinics at five Centers throughout the greater Cincinnati and Northern Kentucky region. Our patients are offered the opportunity to enroll in advanced treatment programs in all disciplines.

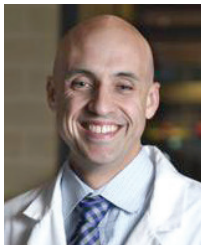
Our sports medicine fellowship is in its 43rd year. We continue to provide a nationally recognized program to train orthopaedic surgeons on advanced and specialized treatment programs and surgery. Our faculty and staff provide the highest professionalism and dedication to this mission. Our fellows are an integral part of our clinical and research programs working closely with our full-time staff and have major commitments to clinical and robotic research studies. We are also pleased to collaborate with medical and hospital organizations and universities across the United States in other educational programs.

Professional Staff

Frank R. Noyes, MD
President, Noyes Knee Institute; Medical Director Cincinnati SportsMedicine Research and Education Foundation; President and CEO, Cincinnati SportsMedicine and Orthopaedic Center — Mercy Health; Sports Medicine Fellowship Director, Cincinnati SportsMedicine and Orthopaedic Center — Mercy Health

Michael S. Laidlaw, MD
Orthopaedic Surgeon, Mercy Health Physicians; Sports Medicine Fellowship Faculty, Cincinnati SportsMedicine and Orthopaedic Center — Mercy Health

Marc T. Galloway, MD
Sports Medicine Fellowship Faculty, Cincinnati SportsMedicine and Orthopaedic Center — Mercy Health; Clinical and Research Faculty, Cincinnati SportsMedicine Research and Education Foundation; Team Physician, Cincinnati Bengals



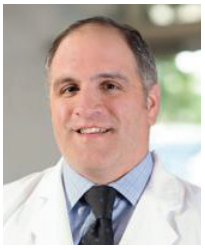
Matthew L. Busam, MD
Orthopaedic Surgeon, Sports Medicine Fellowship Faculty, Cincinnati SportsMedicine and Orthopaedic Center — Mercy Health; Clinical and Research Faculty, Cincinnati SportsMedicine Research and Education Foundation, Chief Medical Officer, FC Cincinnati

Samer S. Hasan, MD, PhD, FAAOS
Co-Director, Shoulder and Elbow Center, Cincinnati SportsMedicine and Orthopaedic Center — Mercy Health; Co-Director Cincinnati Shoulder and Elbow Fellowship; Sports Medicine Fellowship Faculty, Cincinnati SportsMedicine and Orthopaedic Center — Mercy Health; Clinical and Research Faculty, Cincinnati SportsMedicine Research and Education Foundation; Chief of Orthopaedics, The Jewish Hospital

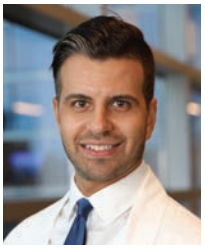
Andrew Kalthoff, MD
Orthopedic Surgeon, Cincinnati SportsMedicine, and Orthopedic Center —Mercy Health; Sports Medicine Fellowship Faculty, Cincinnati SportsMedicine, and Orthopedic Center — Mercy Health

Michael P. Palmer, MD
Orthopaedic Surgeon, The Christ Hospital; Adjunct Clinical Faculty, Cincinnati SportsMedicine Research and Education Foundation

Sambhu N. Choudhury, MD
Orthopaedic Surgeon, Mercy Health, Adjunct Research Faculty, Cincinnati SportsMedicine Research and Education Foundation



Edward A. Marcheschi, MD
Physician, Mercy Health Orthopaedics, Sports Medicine and Spine; Chair, Biologic Orthopaedic Committee, Mercy Health, Adjunct Research Faculty, Cincinnati SportsMedicine Research and Education Foundation



Mahmoud Almasri, MD
Orthopaedic Surgeon, Cincinnati SportsMedicine and Orthopaedic Center-Mercy Health; Sports Medicine Fellowship Faculty, Cincinnati SportsMedicine and Orthopaedic Center — Mercy Health; Director, Cincinnati Hip Preservation Center

Brian Chilelli, MD
Orthopaedic Surgeon, Cincinnati SportsMedicine and Orthopaedic Center — Mercy Health; Sports Medicine Fellowship Faculty, Cincinnati SportsMedicine and Orthopaedic Center-Mercy Health; Director, Knee Restoration and Orthobiologics division; Head Team Physician, Miami University Athletics

Ankit Bansal, MD
Orthopaedic Surgeon, Mercy Health Physicians; Sports Medicine Fellowship Adjunct Faculty, Cincinnati SportsMedicine and Orthopaedic Center — Mercy Health

Professional Staff

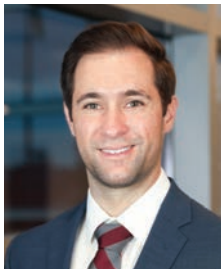
2021-2022 Fellows


Imad Abushahin, MD


Nedal Alkhatib, MD


Naji Madi, MD

2022-2023 Fellows


Brian Kurcz, MD


Brendan Swift, MD


Ting Zhang, MD


Ryan Ziegler, DO

Foundation Staff


Edward Grood, PhD
Emeritus Professor,
University of Cincinnati
Department of Biomedical
Engineering


Cassie Fleckenstein, MS
Manager,
Clinical Research


Jennifer Riccobene, BA
Research Coordinator


Stephanie Smith, MS
Manager,
Sportsmetrics™ Program


Teresa Wood
Fellowship Coordinator/
Administrative Assistant


Carolyn Meder ATC
Sportsmetrics™
Athletic Trainer

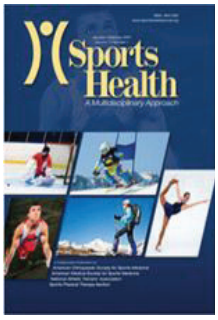

Aimee J. Cannon MS,
ATC Clinical Research
Coordinator

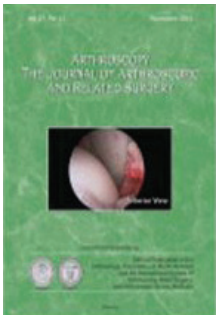

Olivia Clark, BA
Biomechanical
Research Associate

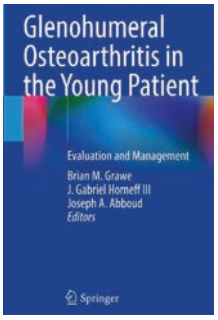

Dawn Packer
Administrative
Assistant

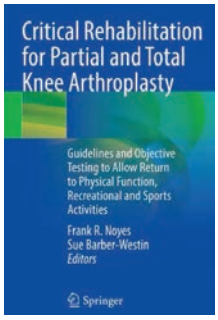

Rebecca Deardurff, BS
Biomechanical
Research Associate

2022 Journal Publications and Textbook Chapters

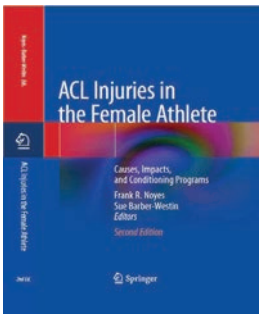




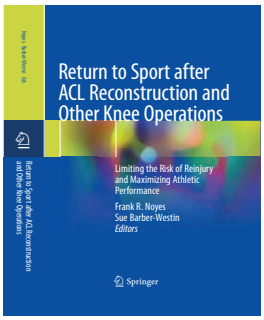




Critical Rehabilitation for Partial and Total Knee Arthroplasty – Written by experts in the field, this textbook focuses on critical rehabilitation principles for return to normal physical function after knee arthroplasty. Advances in surgical techniques, physical therapy principles, objective measures and guidelines are discussed.



ACL Injuries in the Female Athlete – Nearly a million anterior cruciate ligament (ACL) injuries occur each year worldwide, causing long-term problems in the knee joint. This textbook examines the short- and long-term impacts of ACL injuries based on hundreds of published studies.



Return to Sport after ACL Reconstruction and Other Knee Operations – This textbook provides a wealth of information and will enable orthopaedic surgeons, medical practitioners, physical therapists, and athletic trainers to ensure athletes who suffer anterior cruciate ligament (ACL) injuries, or who require major knee operations, have the best possible chance of safely resuming sporting activities without subsequent problems.

A table of bibliometric studies that are representative of our research achievements is shown. Bibliometric science represents a statistical analysis using quantitative methods to establish the scholarly impact of publications and scientific advances on a medical field. The citation of studies published in subsequent publications, in this instance, orthopedics and sports medicine in national and international journals, represents one measure of the scholarly impact of the initial work and publications. The primary authors of these publications are cited, and all authors acknowledge that the honor is spread among the entire research and administrative team that enabled the scholarly research.

Author	Journal	Publication Title	Year	Highlights
Frank R. Noyes, MD	Journal of Bone and Joint Surgery	The Hundred Most-Cited Publications in Orthopedic Knee Research	2011	49 Journals: World-Wide Publications, 1945-2014
Frank R. Noyes, MD	Arthroscopy	The 25 Most-Cited Articles in Arthroscopic Orthopedic Surgery	2012	61 Journals: World-Wide Publications, 1980-2009
Frank R. Noyes, MD	Orthopedics	Fifty Most-Cited Articles in Anterior Cruciate Ligament Research	2015	11 Journals, English; World-Wide Publications, 1980-2013
Frank R. Noyes, MD	Arthroscopy	The Top 100 Most-Cited Articles on Arthroscopy: Most Popular Topic is Rotator Cuff Rather than Cartilage in the Last 5 Years	2021	1950 – March 31, 2020
Samer S. Hasan, MD, PhD	Journal of Surgical Orthopedic Advances	Trends and Characteristics of Highly Cited Articles in Shoulder Arthroplasty	2019	1972-2011
Samer S. Hasan, MD, PhD	International Journal of Orthopedics	The 50 Most Cited Articles in Shoulder Arthroplasty	2016	72 Journals; English; 1900-2016

Knee Division: Clinical Outcome Studies & Applied Clinical Research

– Knee Disorders Prospective Registry
– Robotic Patellofemoral and Tibiofemoral Partial Knee Replacement
– Cartilage and Meniscus Restoration Center
– Patellofemoral Realignment Surgical Restoration
– Tibial and Femoral Osteotomy Realignment Studies

This division is responsible for every phase of our patient-related studies under the direction of Dr. Frank Noyes. The Knee Registry is over 25 years old and numerous clinical studies have been published on all types of complex knee disorders. The publications have a 90% to 100% follow-up, which is a major credit to our research staff that follow our patients throughout the United States.

Patients travel from all over the world to receive specialized care for serious knee disorders and our clinical and research team continues to provide the highest standard of care available with compassion and individualized treatment programs.

The breadth of clinical outcomes studies is featured in the 2nd edition of the Noyes Knee Disorders book published in 2016 that continues as a world-wide textbook in the United States, Asia, India and Europe.

Personnel: Cassie Fleckenstein, Jennifer Riccobene and Aimee Cannon

Textbook Chapters

While hundreds of textbooks have been written regarding technical surgical details of total knee arthroplasty (TKA), little is available on critical rehabilitation principles and guidelines that allow return to recreational and sports activities. This represents the first textbook written for orthopaedic surgeons, residents, physical therapists, and other medical professionals that concentrates on modern rehabilitation strategies after TKA. Fourteen chapters written by the editors and internationally recognized surgeons and therapists focus on:

- Pathophysiology of muscle disuse in osteoarthritis
- Advances in surgical techniques for robotic computer-navigated total and tibiofemoral knee arthroplasty
- Effect of preoperative rehabilitation on postoperative knee function
- Specific rehabilitation principles to avoid complications and return to daily activities
- Advanced physical therapy concepts to return to recreational and sports activities
- Objective testing to determine strength and physical function in the arthroplasty athlete
- Recommended guidelines for recreational and sports activities
- Key factors for achieving high patient satisfaction and quality of life after surgery

The following chapters were written by Dr. Noyes and our research team:

1. Barber-Westin SD, Noyes FR: Chapter 1: Introduction: Epidemiology of Knee Arthroplasty in a Younger Patient Population
2. Noyes FR, Barber-Westin SD: Chapter 2: Preoperative Nutrition and General Health Concerns, Patient Indications, and Selection Criteria
3. Noyes FR: Chapter 4: Advanced Surgical Techniques for Tibiofemoral Knee Arthroplasty
4. Barber-Westin SD, Noyes FR: Chapter 6. Effect of Preoperative Rehabil-itation on Clinical Outcomes and Function after Knee Arthroplasty.
5. Heckmann T, Noyes FR, Barber-Westin SD: Chapter 8: Postoperative Rehabilitation Part I: Strategies and Protocol to Avoid Complications and Return to Daily Activities in Weeks 1-12
6. Noyes FR, Heckmann T, Barber-Westin SD: Chapter 9: Postoperative Rehabilitation Part II: Strategies for Successful Return to Physical Activities and Athletics in Postoperative Weeks 13-52
7. Barber-Westin SD, Noyes FR: Chapter 10: Common Patient-Reported Outcome Measures for Knee Arthroplasty Patients
8. Noyes FR, Barber-Westin SD: Chapter 11: Common Objective Measurements for Strength and Function in the Arthroplasty Patient
9. Barber-Westin SD, Noyes FR: Chapter 12: Recommended Guidelines for Physical Activity and Athletics After Knee Arthroplasty.
10. Barber-Westin SD, Noyes FR: Chapter 14: Key Factors for Achieving Expectations in Patient Satisfaction and Quality of Life after Knee Arthroplasty.

Manuscripts and Book Chapters Under Review/In Press

1. Noyes FR. Patellofemoral Arthroplasty in Active Patients Fifty Years of Age or Younger with Osteoarthritis, Trochlea Dysplasia, Patellar-Femoral Malignment and Failed Cartilage Restorations Procedures, In process.
2. Zhang T, Crampton CT, Smith SL, Noyes FR. Hamstring strengthening exercises with objective measurements to adopt in neuromuscular training program for female athletes: a narrative review. Under review, Journal of Orthopaedic Sports Medicine, 2022.
3. Chilelli BJ, Thakkar A, Zhang T, Bhatia S, et al. Trends in cartilage repair surgery: 2010-2020. Under review, Cartilage, 2022
4. Chilelli BJ, Das V, Bhatia S, Patel RM. Surgical trends and reported complications of medial patellofemoral ligament reconstruction among board eligible orthopaedic surgeons: analysis of data over a 15-year period. Accepted, Arthroscopy, 2022.
5. Chilelli BJ, Gomoll AH. Adapting cartilage restoration to the patellofemoral compartment. In: Shearm SL, Chahla J, Rodeo SA (eds.), Knee Arthroscopy and Knee Preservation Surgery. New York City, NY: Springer, 2022.

Current Major Studies

1. Return to Recreational Activities and Work Following Total Knee Replacement: Introduction of Advanced Conditioning and Performance Programs to Achieve Higher Success Rates: Many patients strive to return to recreational activities and work following total knee replacement. There are three main purposes to this study. 1) Examine the factors that allow total knee replacement patients to return to recreational sports and/or work activities, and to achieve recommended physical activity levels as defined by the American Heart Association and the American College of Sports Medicine. 2) Examine the factors that limit the ability of patients to resume sports, work, and physical fitness training including comorbidities, general health, complications, and other factors. 3) Use advanced sports medicine rehabilitation principles that involve staged progressive protocols to safely prepare patients for sports, work, and physical fitness training. Objective measurements of muscle strength, endurance, balance, and neuromuscular control will be used to determine when patients may be cleared to participate in these activities.
2. Virtual Blood Flow Restriction Training vs. Traditional In-Home Rehabilitation Program: Under the direction of Dr. Noyes, our research team is evaluating strength gains following utilization of a virtual blood flow restriction training program with the use of exercise bands. Patients with muscle atrophy are enrolled into this prospective study. The purpose of this study is to evaluate and report strength gains achieved following virtual blood flow restriction training. The study consists of a 6-week at home program. Patients are randomized into the control group (at home exercise band program alone) or the BFR group (at home exercise band program plus blood flow restriction training).

3. Clinical Outcomes, Patient Satisfaction, and Increased Activity Parameters in Knee Osteoarthritis Patients After Platelet Rich Plasma and Stem Cell Treatment in Two Different Patient Activity Groups: This prospective study aims to determine the efficacy and clinical outcomes of a platelet rich plasma (PRP) injection or an intra-articular injection of stem cells plus bone grafting in different patient groups with knee osteoarthritis.
4. Short- and Long-Term Clinical Outcomes Following MAKO Patellofemoral and Tibiofemoral Joint Replacements: The primary purpose of this investigation is to report the short-and long-term clinical outcomes of patellofemoral arthroplasty (PFA) implanted using the MAKOplasty knee resurfacing system. The secondary purpose of this investigation is to compare the short-term outcomes, complication rates, and survival rates of PFA to historical controls who underwent an osteochondral procedure.
5. Cartilage Restoration of the Knee Joint: The purpose of this research study is to determine the long-term clinical outcomes of patients who receive a cartilage restoration procedure. Procedures being followed for this study include osteochondral autograft transfer, autologous chondrocyte implantation or meniscus transplant. The study objectives are to determine to what extent these operations reduce pain, increase function, and improve the quality of life in patients who have full-thickness cartilage defects and to precisely measure these improvements.
6. High Tibial Osteotomy with TOMA Fix Locking Plate: This study is being conducted to evaluate and report the long-term clinical outcomes of a high tibial osteotomy procedure with the use of the TOMA fix locking plate. Patients are evaluated at 1, 2, 5, 7, and 10 years post-operatively.
7. Long-term Clinical Outcomes Following Meniscus Transplantation: The purpose of this study is to evaluate the long-term outcomes following meniscus transplantation. The study objectives measured include decrease in pain, increase in function, and improvement of quality of life.
8. MPFL Reconstruction with Proximal Patellar Realignment: This prospective study is being conducted to evaluate the clinical outcomes following medial patellofemoral ligament (MPFL) reconstruction in patients with chronic patellar subluxation. Patients will be evaluated preoperatively and again at 1, 2, 5, 7, and 10 years post-operatively.

Shoulder Division: Clinical Outcome Studies & Applied Clinical Research

The Shoulder Center under the direction of Samer S. Hasan, MD, PhD had a productive 2022. On the clinical side, surgical volume has returned to pre-pandemic levels. Dr. Hasan performed nearly 500 shoulder and elbow surgeries, including 150 arthroscopic rotator cuff repairs and nearly 200 shoulder replacement surgeries. To date Dr. Hasan has performed over 2000 arthroscopic rotator cuff repairs and over 2000 shoulder replacement surgeries, which is milestone that has been achieved by only a handful of surgeons in the Midwest.

Dr. Hasan is also pioneering the use of the subacromial balloon spacer for treatment of massive irreparable rotator cuff tears. The spacer is an arthroscopically deployed, saline-filled, biodegradable balloon that helps recenter the humeral head in patients with chronic irreparable rotator cuff tears. The balloon helps improve shoulder comfort, active motion, and function. Between 2017 and 2019 Dr. Hasan's practice was one of 18 sites participating in a multi-center clinical trial that evaluated the subacromial balloon spacer. The randomized clinical trial demonstrated safety and effectiveness of the subacromial balloon spacer and upon review of the data submitted from the clinical trial, the FDA approved the use of the novel device in August 2021. Dr. Hasan currently performs the arthroscopic subacromial balloon spacer procedure and several of his patients who underwent the procedure in 2021 have already been discharged from his care with dramatic pain relief and substantial improvement in their shoulder function.

Dr. Hasan is also performing a broad array of tendon transfers to improve shoulder strength in patients with irreparable rotator cuff tears. These include lower trapezius transfer for irreparable posterior cuff tears and latissimus dorsi transfers for patients with subscapularis insufficiency. Dr. Hasan also performs the modified L'Episcopo transfer, which is a version of the latissimus tendon transfer, combined with reverse shoulder replacement, in select patients who lack both active shoulder elevation and external rotation.

Dr. Hasan also performs the entire spectrum of arthroscopic and open instability surgeries for patients with various types of glenohumeral instability. He has a tertiary referral practice for complex shoulder instability and has performed over 150 arthroscopic posterior labrum repairs. He has performed nearly 50 open Latarjet procedures (coracoid process transfer to the anterior glenoid through a subscapularis tendon split) and has also performed salvage open reconstructions using distal tibial allograft and humeral head autograft when combined with humeral head replacement.

In terms of leadership activity, Dr. Hasan serves as Chair of the Orthopedic Service Line for Mercy Health — Cincinnati and as Chief of Orthopedics at The Jewish Hospital. He is also Chair of the Bon Secours-Mercy Health Clinical Transformation Committee.

Dr. Hasan has been active in various capacities with the American Shoulder and Elbow Surgeons. Since October 2020 he has served as co-chair of the Education Committee, which is charged with developing education content for members of the society as well as orthopedic surgeons worldwide. Dr. Hasan co-directed the development of a 100

question ASES self-assessment examination in Shoulder and Elbow that fulfills requirements of the American Board of Orthopaedic Surgeons for Maintenance of Certification. A second self-assessment examination is being curated for release in 2023.

Dr. Hasan has presented at various in person and virtual educational meetings throughout 2022. In February, he co-chaired a one day ASES course on "Proximal Humerus Fractures: from Repair to Reverse", held in Tampa, Florida. In March, he presented Grand Rounds at Northwestern University Feinberg School of Medicine on "Treatment options for the irreparable rotator cuff tear without pseudoparalysis". He also served as a panelist for the symposium on "Management of the Walch B2 Glenoid" at the ASES Specialty Day, held immediately following the AAOS Annual Meeting in Chicago. In May, he presented a poster at the AANA Annual Meeting in San Francisco and participated as speaker and moderator at the Advances course in Hilton Head Island, South Carolina. In November, he served as faculty for the AAOS/ASES Anatomic and Reverse Total Shoulder Arthroplasty Course, held in Chicago. He has been a speaker, moderator, and panelist for various industry sponsored courses and symposia.

Dr. Hasan has also published several peer reviewed journal articles and case reports, including a review article on the "Ream and run procedure" and a technique report on combined arthroscopic glenohumeral joint stabilization and arthroscopic coracoclavicular ligament reconstruction. Dr. Hasan published a clinical study on the results of shoulder replacement surgery in patients 40 years or younger, drawing from years of experience treating very young patients with glenohumeral chondrolysis and other destructive joint conditions. Additionally, he published a study on the outcomes of reverse shoulder arthroplasty in patients 85 years and older that demonstrated the safety and durability of the surgery in carefully selected patients, irrespective of their chronologic age. Despite a mean age of 88 years, patients lived an average of more than 4 years with their replaced shoulder. Remarkably, only 2 of 61 patients (3%) needed any further surgery on their operated shoulder. Several other manuscripts are in various stages of preparation.

Personnel: Cassie Fleckenstein, Jennifer Riccobene and Aimee Cannon

Publications

1. Matsen, F.A. III., Carofino, B.C., Green, A., Hasan S.S., Hsu, J.E., Lazarus, M.D., McElvany, M.D., Moskal, M.J., Parsons, I.M. 4th, Saltzman, M.D., Warme, W.J., "Shoulder Hemiarthroplasty with Non-Prosthetic Glenoid Arthroplasty: The Ream and Run Procedure", JBJS Rev. 2021 Aug 25;9(8). doi: 10.2106/JBJS.RVW.20.00243. PMID: 34432729.
2. Hasan, S.S., "Editorial Commentary: A Consensus of Experts Complements the Clinical Evidence on Diagnosis and Treatment of Anterior Glenohumeral Instability", Arthroscopy, 2022 Feb;38(2):243-246.
3. Chaudry Z., Almasri M., Hasan, S.S., "Addressing Arthroscopic-Assisted Acromioclavicular Joint Reconstruction in the Beach Chair Position with Concomitant Labral Pathology in the Lateral Decubitus Position", Arthrosc Tech., 2022 Apr:11(5):e847-e855.
4. Almasri, M., Kohrs, B., Fleckenstein, C.M., Nolan, J., Wendt, A., Hasan, S.S. "Reverse Shoulder Arthroplasty in Patients 85 Years and Older is Safe Effective and Durable", J Shoulder Elbow Surg., 2022 May 9;S1058-2746(22)00423-2.61.
5. Hasan, S.S., Schwindel L.E., Fleckenstein, C.M., "Prosthetic shoulder arthroplasty in patients 40 years or younger: outcomes stratified by diagnosis and surgery", Clin Shoulder Elbow, November 16, 2022. doi: https://doi.org/10.5397/cise.2022.01088

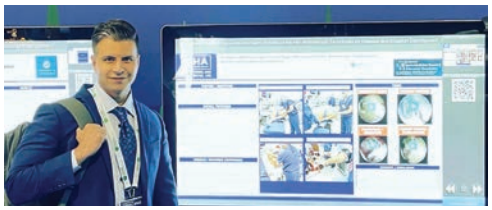
Manuscripts/Textbook chapters under review, in press

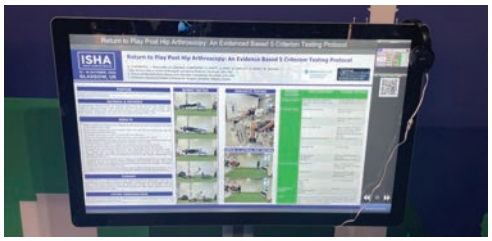
1. Mahoney, J.R. and Hasan, S.S., "Total Shoulder Arthroplasty for Glenohumeral Arthritis in a Young Patient", In Glenohumeral Osteoarthritis in the Young Patient, G. Horneff, B. Grawe, and J. Abboud, eds. Springer Nature Switzerland, 2022, pp. 119-141.

Current Studies

1. Clinical and MRI Outcomes of Patients Undergoing Repair of Large and Massive Rotator Cuff Tears with Collagen Patch Augmentation: A Retrospective Cohort Study: The purpose of this study is to evaluate the clinical outcomes of collagen patch augmentation for large and massive rotator cuff tears. Dr. Hasan is currently collecting MRI data, active range of motion, complications, healing rates, and patient reported outcome measures. Results for patients who received the collagen patch augmentation will be compared to a cohort of historical patients who underwent repair of similar tears but without the use of a patch.
2. OrthoSpace iAccelerate study to explore the effect of rehabilitation cadence on outcome after arthroscopic subacromial balloon spacer procedure. Dr. Hasan will be recruiting patients into this multicenter randomized clinical trial. Early outcomes following subacromial balloon spacer procedure. Dr. Hasan is evaluating the early clinical outcomes, including range of motion, patient reported outcomes, and patient satisfaction in a consecutive series of patients beginning with his first post-market procedure in October 2021.
3. OrthoFix Multi-Center Study on the Efficacy of Pulsed Electromagnetic Field (PEMF) Therapy as an Adjunctive Treatment to Surgical Repair of Full Thickness Rotator Cuff Tears: This is a multi-center randomized controlled clinical trial aimed at evaluating the effects of PEMF technology on promoting tendon to bone healing after arthroscopic rotator cuff repair.
4. American Shoulder and Elbow Surgeons (ASES) Multi-Center Young OA Study: The purpose of this prospective, multi-center study is to determine the predictors of successful outcome following arthroscopic management of glenohumeral arthritis in younger patients.
5. American Shoulder and Elbow Surgeons (ASES) Multi-Center Massive Rotator Cuff Study: The purpose of this data repository is to create a source of higher quality clinical evidence that may inform future clinical decision-making and studies regarding the eight most common treatment methods for massive rotator cuff tears.
6. Glenohumeral Shoulder Rotation and Arc of Motion in Overhead Athletes: This study is being conducted to evaluate the isolated glenohumeral rotations in overhead athletes and to correlate internal rotation deficits with number of years overhead sports participation.
7. BAND-Connect: This is an industry-initiated study to evaluate a new and novel tool for post-operative rehabilitation after rotator cuff repair or shoulder arthroplasty.

Hip Division: Clinical Outcome Studies & Applied Clinical Research





Under the direction of Dr. Mahmoud Almasri, Dr. Ankit Bansal, and adjunct faculty, Dr. Michael Palmer, the hip division is responsible for every phase of patient related clinical outcomes studies. The Hip Arthroscopy and Joint Preservation Center provides patients with a cutting edge, multidisciplinary approach. Utilizing the latest techniques in arthroscopic and open surgery, injections, and non-surgical rehabilitation protocols, the Center aims to provide young, active individuals with the best evidence-based treatment for relieving hip pain, delaying the progression of end stage arthritis, and returning individuals to sports and function. The Center is actively engaged in research and education efforts to advance the understanding of hip and joint preservation, sports medicine, and orthopaedic wellness.

In 2022, Dr. Mahmoud Almasri was named the FC Cincinnati 2 and FCC Academy physician. In addition to his role with FC Cincinnati, Dr. Almasri is also the hip specialist for the Cincinnati Ballet. He was instrumental in helping one of the company ballerinas overcome an injury and successfully participate in the 2022 Nutcraker performance.

Personnel: Cassie Fleckenstein, Jennifer Riccobene and Aimee Cannon

Current Studies

1. Brace vs no Brace (accelerated versus standard hip scope rehab)
2. Minimally invasive hip muscle repair vs open (endoscopic abductor repair)
3. Patch vs no Patch for abductor repair
4. General Outcomes and return to sport post hip arthroscopy in young active hip disorders
5. Normative Data for Hip Biodex in general population
6. Hip Injury Prevention Program (HIPP) Sportsmetrics
7. Return to play post hip arthroscopy, 5 criterian based protocol

Publications

1. Almasri M, Simunovic N, Heels-Ansdell D, Ayeni OR, FIRST Investigators. Femoroacetabular impingement surgery leads to early pain relief but minimal functional gains past 6 months: experience from the FIRST trial. Knee Surg Sports Traumatol Arthrosc, 2021. 29(5): 1362-1369.
2. Cohen D, Khan A, Kay J, Slawaska-Eng D, Almasri M, et al. There is no definite consensus on the adequate radiographic correction in arthroscopic osteochondroplasty for femoroacetabular impingement: a systematic review and meta-analysis. Knee Surg Sports Traumatol Arthrosc, 2021. 29(9): 2799-2818.
3. Almasri M, Simunovic N, Heels-Ansdell D, Ayenil OR, FIRST Investigators. Osteochondroplasty benefits the pragmatic patient with femoroacetabular impingement: analysis from the embedded prospective cohort of the femoroacetabular impingement randomized controlled trial (FIRST). Arthroscopy, 2021. July 9. E-pub ahead of print.
4. Scheidt M, Haber DB, Bhatia S, Ellman MB. Technical Pearls for Arthroscopic Labral Augmentation of the Hip. Arthrosc Tech. 2021 Mar 12;10(4): e1047-e1053. doi: 10.1016/j.eats.2020.12.004. PMID: 33981549; PMCID: PMC8085363.

Awards/Recognitions

1. Dr. Almasri: Recipient: Best Clinical Research Paper in Arthroscopy June 2021, Sports Medicine Category - Canadian Orthopaedic Association (COA) 2021Annual Meeting, Awarded by the Arthroscopy Association of Canada, only 1 recipient out of over 100 sports medicine presentations at the annual meeting.

Sports Medicine Division

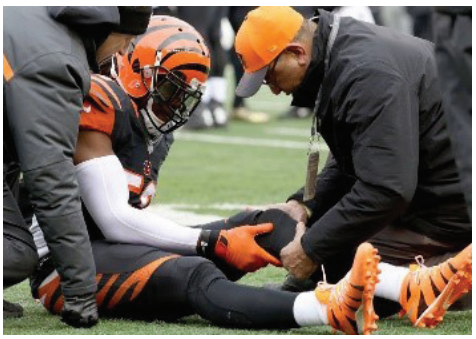
The CSMOC sports medicine physicians had a busy and exciting 2022. As noted in our 2021 report, Dr. Marc Galloway likely had the most exciting season of coverage as head team physician for the AFC Champion and Super Bowl contender, Cincinnati Bengals. While the team didn't bring home the Lombardi trophy in 2022, the Bengal faithful are hopeful that we will get to see Dr. Galloway in action again during Super Bowl LVII.

Under the expert medical care provided by Dr. Matt Busam, FC Cincinnati made a run into the MLS playoffs. For the first time in franchise history, FC Cincinnati hosted a playoff match at TQL Stadium. The Cincinnati faithful packed the house with a record attendance of over 25,000 people. FC made it to the Eastern Conference semifinals before falling to Philadelphia Union.

Drs. Matt Busam, Mahmoud Almasri, and other members of the FC Cincinnati medical staff participated in the annual MLS Medical symposium in Orlando, Florida. The team learned updates on non-operative and operative sports medicine care of the professional soccer player. Knowledge learned will be applied for the treatment of these elite athletes during the upcoming 2023 season.

In December, Dr. Brian Chilelli and sports medicine fellow, Dr. Brian Kurcz, packed their bags and headed south to care for the Miami University football team as they played in the Bahamas Bowl. In addition to covering Miami's bowl game, Dr. Chilelli provided coverage for all the Redhawk sports teams throughout the 2022 season.

In addition to the coverage provided to collegiate and professional athletes, our sports medicine faculty and fellows can also be found on the sidelines at our local high schools. Sideline coverage provides a well-rounded sports experience for our sports medicine fellows.



Biomechanics and Robotics Division

Under the direction of Frank R. Noyes, MD and Edward S. Grood, PhD (Professor Emeritus, University of Cincinnati Department of Biomedical Engineering) the Biomechanics and Robotics Division conducts in-vitro studies on cadaveric knees using a highly sophisticated, custom-designed robotic system based on the Grood-Suntay coordinate system. The robotic system applies precise motions and loads determining three dimensional motions and tibiofemoral compartment displacements. The purpose of these investigations is to better understand knee ligament function, surgical reconstructions to restore knee stability after injury, and replacement.

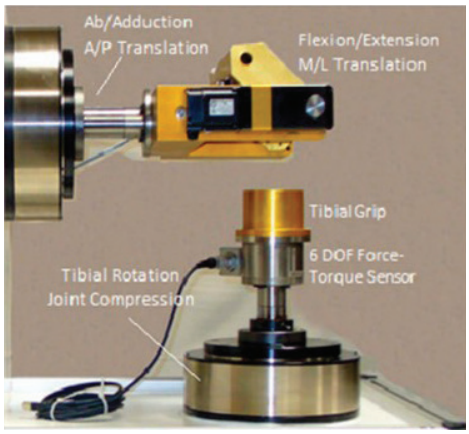
Personnel: Edward S. Grood, PhD, Olivia Clark, BA, Rebecca Deardurff, BS, Clinical Fellows

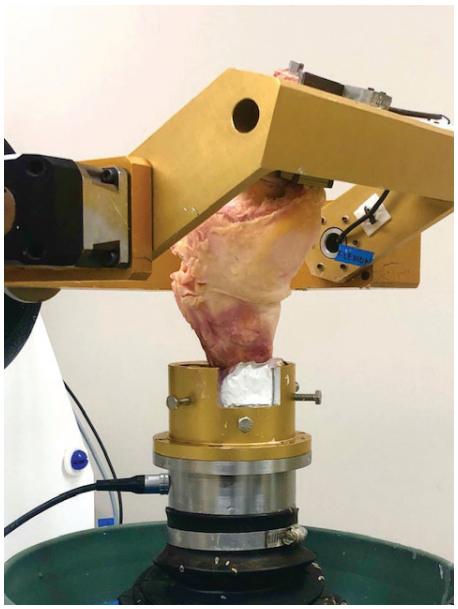
Publications

1. Noyes FR, Clark OM, Grood ES, Johnson DJ. The function of the cruciate ligaments, posterior capsule and other structures in resisting knee hyperextension: A robotic analysis of cadaveric knees. Accepted for publication, American Journal of Sports Medicine 2022

Current Studies

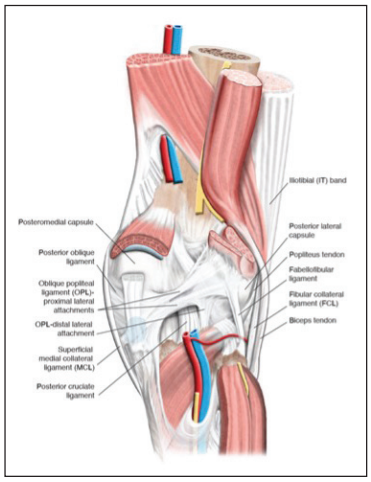
1. Analysis of the functional interaction of the cruciate ligaments, posterior capsule, and other structures in the knee during hyperextension.
2. The effect of cyclic loading on the integrity and stability of a MACI implanted knee cartilage restoration procedure.





Synopsis of Work

Our research is performed on a custom 6 degree-of-freedom robotic simulator that was developed and built by Edward S. Grood, PhD. Measurements of translations, rotations, and loads on all 3 axes are displayed and recorded in real-time. This year was spent teaching our newest addition, Olivia Clark, and updating the robotic system, as well as conducting a study to review the structures that actively resist hyperextension.

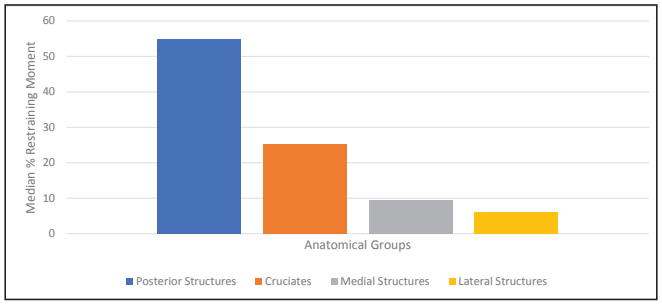


The Functional Interaction of the Cruciate Ligaments, Posteromedial and Posterolateral Capsule, Oblique Popliteal Ligament and Other Structures in Preventing Abnormal Knee Hyperextension was submitted to the American Journal of Sports Medicine in August.

Background: The ligaments and soft tissue capsular structures of the knee joint providing a resisting force to prevent abnormal knee hyperextension have not been determined. This knowledge is required for the diagnosis and treatment of knee hyperextension abnormalities. The purpose of this study is to determine the resisting moment of knee ligament and capsular structures that resist knee hyperextension.

Study Design: Descriptive Laboratory Study

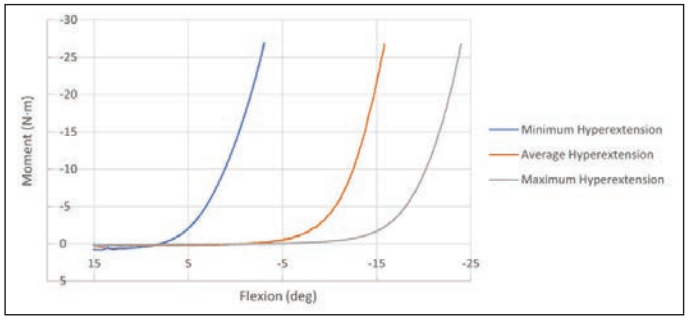
Hypothesis: The combined posteromedial and posterolateral capsular structures function to provide a major restraint to prevent abnormal knee hyperextension. The anterior and posterior cruciate ligaments resist knee hyperextension however function as secondary restraints.



Methods: A 6-degree-of-freedom robotic system determined intact laxity limits in 24 cadaveric knees from 0 to 100 degrees knee flexion for anterior-posterior limits at ±135 N, abduction-adduction limits at ±7 N·m, and external-internal limits at ±5 N·m. One loading method (N=14 knees) used a static loading sequence with knee hyperextension to 27 N·m torque and maintaining all other degrees of freedom at zero-load during sequential soft tissue cutting. The second method (N=10 knees) used a cyclic loading sequence, to decrease viscoelastic effects, with soft tissue cutting at zero degrees extension followed by knee hyperextension to 27 N·m torque and cycled back to zero degrees. Selective soft tissue cuttings were performed of the oblique popliteal ligament, fabellofibular ligament, posterior medial capsule with posterior oblique ligament, posterolateral capsule, cruciate ligaments, lateral collateral ligament, popliteus, anterolateral ligament and iliotibial band and superficial plus deep medial collateral ligaments. The soft tissues were grouped anatomically for analysis. The sequential loss in the restraining moment with sectioning provides the function of that structure in resisting knee hyperextension.

Results: The median resisting force to knee hyperextension in descending order were the posterior medial capsule and posterior oblique ligament (21.7%), posterior lateral ligament and fabellofibular ligament (17.1%), anterior and posterior cruciate ligaments (13%, 12.9%), superior and deep medial collateral ligament(9.6%), oblique popliteal ligament (7.7%) and lateral collateral ligament (5.4%). The combined posterior capsular structures provided 54.7% and anterior and posterior cruciate ligaments 25.3% of the total resisting moment to prevent knee hyperextension.

The results of this study affirmed our hypothesis of the multiple soft tissue restraints that interact to prevent knee hyperextension with no single dominant primary restraint. Below is a moment versus angle curve obtained from the last loading cycle for the specimens comparing the minimum, average, and maximum degrees of hyperextension. The data shows the variability between knee specimens to the same hyperextension moment of 27 N·m.



Conclusions: Diagnosis of abnormal knee hyperextension involves a combination of multiple ligament and soft tissue structures without one primary restraint. The posteromedial and posterolateral capsular structures provided the major resisting moment to prevent knee hyperextension. The cruciate ligaments provided a lesser resisting moment to knee hyperextension.

Clinical Relevance: This is the first study to comprehensively measure all of the knee ligament and capsular structures providing a resisting moment to abnormal knee hyperextension. This data is required for diagnostic and treatment strategies on the pathomechanics of abnormal knee hyperextension in patients after injury or developmental cases.

Biomechanics and Robotics Division

The Foundation congratulates the authors who participated in our robotics studies over the past 7 years. In addition to the robotic engineering staff, these research efforts included 6 fellows and resulted in publications in the Journal of Bone and Joint Surgery, Arthroscopy, and American Journal of Sports Medicine. Results were presented as a podium presentation at the American Academy of Orthopaedic Surgeons annual meeting. This is an impressive list of peer-reviewed publications.

Anterior Cruciate Ligament Function in Providing Rotational Stability Assessed by Medial and Lateral Tibiofemoral Compartment Translations and Subluxations

Frank R. Noyes,*†‡ MD, Andrew W. Jetter,† BS, Edward S. Grood,§ PhD, Samuel P. Harms,† MD, Eric J. Gardner,† MD, and Martin S. Levy,‖ PhD
Investigation performed at Cincinnati Sports Medicine and Orthopedic Center, Cincinnati, Ohio, USA

American Journal of Sports Med, 2014

Anatomic Single-Graft Anterior Cruciate Ligament Reconstruction Restores Rotational Stability: A Robotic Study in Cadaveric Knees

Samuel P. Harms, M.D., Frank R. Noyes, M.D., Edward S. Grood, Ph.D., Andrew W. Jetter, B.S., Lauren E. Huser, M.Eng., Martin S. Levy, Ph.D., and Eric J. Gardner, M.D.

Arthroscopy, 2015

Effect of Anteromedial and Posterolateral Anterior Cruciate Ligament Bundles on Resisting Medial and Lateral Tibiofemoral Compartment Subluxations

Eric J. Gardner, M.D., Frank R. Noyes, M.D., Andrew W. Jetter, B.S., Edward S. Grood, Ph.D., Samuel P. Harms, M.D., and Martin S. Levy, Ph.D.

Arthroscopy, 2015

Editorial Commentary: **Lateral Extra-articular Reconstructions With Anterior Cruciate Ligament Surgery: Are These Operative Procedures Supported by In Vitro Biomechanical Studies?**

Arthroscopy, 2016

Anterolateral Ligament and Iliotibial Band Control of Rotational Stability in the Anterior Cruciate Ligament—Intact Knee: Defined by Tibiofemoral Compartment Translations and Rotations

Lauren E. Huser, M.Eng., Frank R. Noyes, M.D., Darin Jurgensmeier, M.D., and Martin S. Levy, Ph.D.

Arthroscopy, 2017

Is an Anterolateral Ligament Reconstruction Required in ACL-Reconstructed Knees With Associated Injury to the Anterolateral Structures?

A Robotic Analysis of Rotational Knee Stability

Frank R. Noyes,*† MD, Lauren E. Huser,*†§ MEng, Darin Jurgensmeier,*† MD, James Walsh,*† DO, and Martin S. Levy,† PhD
Investigation performed at Cincinnati Sports Medicine and Orthopaedic Center–Mercy Health, Cincinnati, Ohio, USA

American Journal of Sports Med, 2017

Rotational Knee Instability in ACL-Deficient Knees

Role of the Anterolateral Ligament and Iliotibial Band as Defined by Tibiofemoral Compartment Translations and Rotations

Frank R. Noyes, MD, Lauren E. Huser, MEng, and Martin S. Levy, PhD
Investigation performed at The Noyes Knee Institute, Cincinnati, Ohio

Journal of Bone and Joint Surg, 2017

Two Different Knee Rotational Instabilities Occur With Anterior Cruciate Ligament and Anterolateral Ligament Injuries: A Robotic Study on Anterior Cruciate Ligament and Extra-articular Reconstructions in Restoring Rotational Stability

Frank R. Noyes, M.D., Lauren E. Huser, M.Eng., John West, M.D., Darin Jurgensmeier, M.D., James Walsh, D.O., and Martin S. Levy, Ph.D.

Arthroscopy, 2018

The Effect of an ACL Reconstruction in Controlling Rotational Knee Stability in Knees with Intact and Physiologic Laxity of Secondary Restraints as Defined by Tibiofemoral Compartment Translations and Graft Forces

Frank R. Noyes, MD, Lauren E. Huser, MEng, and Martin S. Levy, PhD
Investigation performed at The Jewish Hospital-Mercy Health and The Noyes Knee Institute, Cincinnati, Ohio

Journal of Bone and Joint Surg, 2018

Anterior Cruciate Ligament Graft Conditioning Required to Prevent an Abnormal Lachman and Pivot Shift After ACL Reconstruction

A Robotic Study of 3 ACL Graft Constructs

Frank R. Noyes,* MD, Lauren E. Huser,*† MEng, Brad Ashman,* MD, and Michael Palmer,* MD
Investigation performed at The Jewish Hospital–Mercy Health and The Noyes Knee Institute, Cincinnati, Ohio, USA

American Journal of Sports Med, 2019

A Biomechanical Study of Pivot-Shift and Lachman Translations in Anterior Cruciate Ligament-Sectioned Knees, Anterior Cruciate Ligament-Reconstructed Knees, and Knees With Partial Anterior Cruciate Ligament Graft Slackening: Instrumented Lachman Tests Statistically Correlate and Supplement Subjective Pivot-Shift Tests

Frank R. Noyes, M.D., Lauren E. Huser, M.Eng., and Michael Palmer, M.D.

Arthroscopy, 2021

Biologics Division: Clinical Outcomes Studies and Applied Clinical Research

Under the direction of Dr. Brian Chilelli, the Cincinnati SportsMedicine and Orthopaedic Center Mercy Health division of Orthobiologics continues to provide a high level of care to patients with a focus on the transparency of potential outcomes through an evidence-based approach to patient care. Treatment modalities have included platelet-rich plasma (PRP), bone marrow aspirate concentrate (BMAC), and micro-fragmented adipose tissue (MFAT) to treat a multitude of degenerative, over-use, and acute musculoskeletal conditions.

As an initial pilot study, the first three microfragmented adipose injections were successfully performed by Drs. Brian Chilelli and Edward Marcheschi in late 2021 to treat patients with mild to moderate osteoarthritis of the knee. The patients have been followed prospectively using a high-level patient reported outcome platform. All of the patients have experienced significant improvement in symptoms as demonstrated by favorable validated patient reported outcome measures obtained one year from the procedure. The patients have continued to experience relief of symptoms and have not required additional treatments or interventions to date. It is now known that PRP, BMAC, and MFAT injections do have a role in decreasing symptoms of knee arthritis. However, no study has ever shown that these injections will regenerate articular cartilage. However, recent data suggests that orthobiologic agents may have an augmentative role when combined with other surgeries such as meniscus repair and cartilage restoration surgery in order to enhance healing. Dr. Chilelli is currently assessing the efficacy of using BMAC combined with autologous minced cartilage and micronized allograft cartilage to treat symptomatic cartilage defects of the knee. In addition, The Mercy Health — Cincinnati SportsMedicine and Orthopaedic Center has been chosen to be a site for a multi-center study comparing PRP vs marrow ventilation for biologic augmentation of meniscus repairs.

Personnel: Cassie Fleckenstein, Jennifer Riccobene and Aimee Cannon

In addition to the use for the treatment of knee osteoarthritis, orthobiologics also play a role in the treatment of patients with arthrofibrosis. Our arthrofibrosis center draws patients from all over the United States. The center uses a three-prong approach to treat arthrofibrosis: 1) arthroscopic surgical release, 2)specialized rehabilitation, 3) use of biologics to diminish the return of scar tissue.

Biologics Division: Clinical Outcomes Studies and Applied Clinical Research

Current Major Studies

1. Bone Marrow Aspirate Concentrate (BMAC): Principal Investigator: Dr. Sambhu Choudhury
    a. Independent analysis of 44 patients. Patient reported outcomes were collected at 3, 6, and 12 months post-operative.
    b. This robust clinical evaluation has been completed and is in the process of write up and publication.
    c. This study specifically examines the role of BMAC in patients who are unable to undergo total knee replacement due to serious medical issues and have disabling pain effecting all activities of daily living. The goal is to determine if a reasonable measure of relief can be obtained to decrease patient pain, allow time for optimization for TKR and to avoid patient turning to opiates to relieve severe knee pain.
2. Prospective, Multi-center Randomized Control Trial: Principal Investigator: Dr. Brian Chilelli (Meniscal Repair Biologic Augmentation: Marrow Venting Procedure Versus PRP, MVP Trial)
    a. Prospective RCT of a commercial platelet rich plasma (PRP) intraarticular knee injection compared to marrow ventilation during meniscus repair surgery
    b. Active patients, age 16 years or older will be enrolled into this study.
    c. Data will be collected at 3, 6, and 12 months post injection. The data collected will be detailed and include subjective, objective, functional assessments and patient reported outcomes using validated knee scores.
    d. The goal of this study is to determine whether PRP or marrow ventilation is more efficacious to biologic healing of meniscus tears based on patient reported outcome measures and failure rates.
3. Prospective, Multi-center Randomized Control Trial: Principal Investigators Dr. Brian Chilelli, Dr. Frank Noyes
    a. This trial will initiate in 2023 and involves a clinical outcome study in using microfragmented adipose tissue for the intraarticular knee injection for osteoarthritis compared to cortisone injection.
    b. Patients with Kellgren Lawrence grade 2 or 3 osteoarthritis of the knee will be enrolled into this study.
    c. Data will be collected at 3, 6, and 12 months post injection. The data collected will be detailed and include subjective, objective, functional assessments and patient reported outcomes using validated knee scores.
    d. The goal of this study is to compare cortisone injection to MFAT injection for the treatment of osteoarthritis of the knee based on patient reported outcome measures

4. Prospective, Cohort Study: Principal Investigator: Dr. Brian Chilelli
    a. Autologous minced cartilage, micronized allograft cartilage, and BMAC with a collagen membrane to treat symptomatic full thickness cartilage defects of the knee.
    b. Active patients, age 18 years or older with symptomatic full thickness cartilage defects of the knee are being enrolled into this study.
    c. Data will be collected at 3, 6, and 12 months post injection. The data collected will be detailed and include subjective, objective, functional assessments and patient reported outcomes using validated knee scores.
    d. The goal of this study is to determine the efficacy of this novel and innovative cartilage restoration technique

Publications

1. Zhang T, Akhter F, Almasri M, Chilelli BJ. All arthroscopic matrix-associated autologous chondrocyte implantation for a femoral trochlea cartilage defect. Under Review, Arthroscopy Techniques, 2022.

Neuromuscular Studies, Sportsmetrics™ Training Division

Sportsmetrics™ is the first and largest ACL injury prevention program scientifically proven to decrease serious knee ligament injuries in female athletes. The main goal of the Sportsmetrics™ Training Division is to develop and implement neuromuscular training programs that are effective in both preventing non-contact ACL injuries and improving athletic performance indicators. In addition to our formal Sportsmetrics™ program, we also offer the following training programs: Sportsmetrics™ Warm-Up for Injury Prevention and Performance (WIPP), Sportsmetrics™ Return to Play, Sportsmetrics™ Agility and Speed, Sportsmetrics™ Sports Injury Testing, Sportsmetrics™ Female Health Education, and Sportsmetrics™ Introduction to Athletics. A detailed description of each program is provided in this section.

We are also proud to announce the development of an anti-vaping initiative in high school athletes. Vaping is an epidemic that is impacting our young and vulnerable students and athletes.

Personnel: Stephanie Smith and Carolyn Meder

Current Studies

1. Effect of Sportsmetrics™ Training After ACL Reconstruction in Preventing Re-Injuries Upon Return to Sport.
2. Effect of Sportsmetrics™ Training in Local Female High School Athletes in Preventing Noncontact ACL Injuries.
3. Effect of an Advanced Sportsmetrics™ Training Program in Local Female High School Athletes in Preventing Noncontact ACL Injuries and Improving Sports Performance.
4. Effects of Sportsmetrics™ and Behavioral Training as a Vaping Diversion Program in High School Students
5. Effect of Sportsmetrics™ Training in Professional Student Division Ballet Dancers on neuromuscular indices and knee injuries.

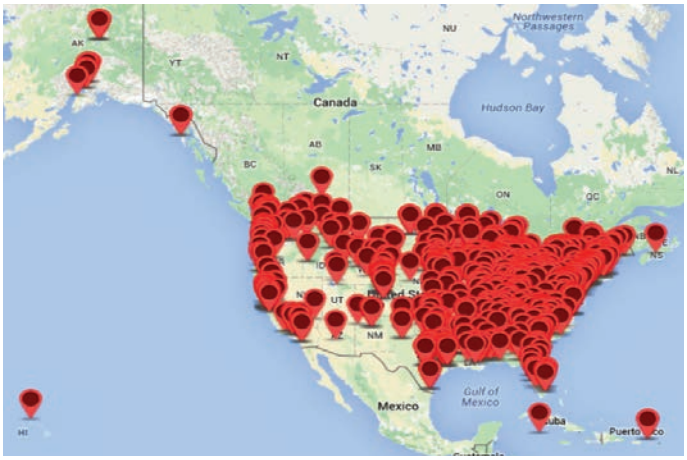
Number of Athletes Trained

- Over 5,000 athletes trained in the Cincinnati area since 2001 with overall significant improvements in neuromuscular indices, strength and conditioning levels.
- 130 athletes in 2022

Sportsmetrics™ Certification Program

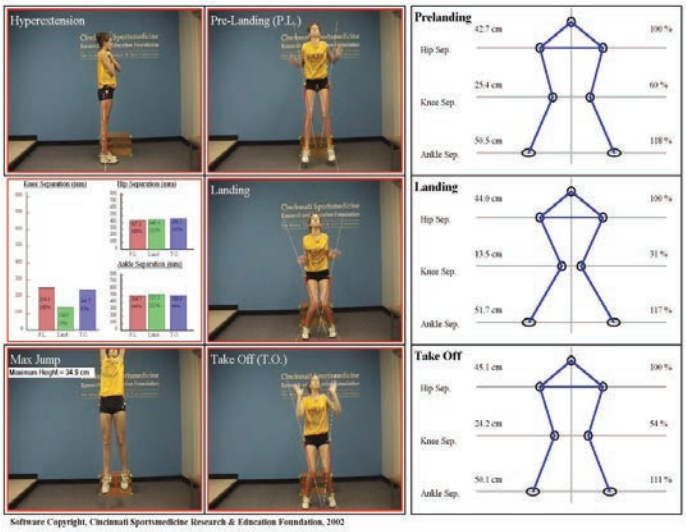
Our Sportsmetrics™ certification program allows physical therapists, athletic trainers, and other healthcare professionals the opportunity to be part of the largest injury prevention program in the country. Our certified instructors use the scientifically-proven Sportsmetrics™ program as part of their rehabilitation program or in a group training scenario with high school and college athletes. Since 2002, we have certified over 2600 individuals from over 1500 sites. We have certified trainers in all 50 states and 16 countries.

In 2022, 100 individuals were certified to offer the Sportsmetrics™ program to their communities. This year continued to present challenges with in-person education. We continued to offer virtual learning and found that we were able to offer the same quality of education as our in-person courses with a farther reach to individuals who would otherwise be unable to travel.



International Sites

Austria, Australia, Brazil, Canada, Finland, Greece, Hungary, Iceland, United Kingdom, Japan, Qatar, The Netherlands, Singapore, Switzerland, UAE and India



On-Site Host Sites since 2002 and number certified

1. Duly Health & Care (18): Chicago, IL
2. Hulst-Jepsen Physical Therapy (31): Grand Rapids, MI
3. Premier Bone & Joint Centers (19): Laramie, WY
4. SERC Physical Therapy (45): Kansas City, MO
5. Dayton Children's Hospital (18): Dayton, OH
6. University of Louisiana - Lafayette (10): Lafayette, LA
7. Emeryville Sports Physical Therapy (10): Emeryville, CA
8. Therapeutic Associates (46): Portland, OR
9. Carolinas Rehabilitation (34): Charlotte, NC
10. Community Rehab (17): Fremont, NE
11. McLeod Sports Medicine (25): Florence, SC
12. Ivy Rehab (23): Hoboken, NJ
13. Victory Sports Medicine (20): Skaneateles, NY
14. North Dakota State University (12): Fargo, ND
15. Apex Physical Therapy (10): San Mateo, CA
16. Georgia Sports Medicine (21): Atlanta, GA
17. The Jackson Clinics (30): Reston, VA
18. Hurley SportsCare (13): Flint, MI
19. SportsCare Memorial Medical Center (32): Springfield, IL
20. Physiotherapy Associates (18): Denver, CO
21. Physiotherapy Associates (15): Dover, DE
22. Northern Michigan Sports Medicine Center (16): Indian River, MI
23. Kitsap Physical Therapy & Sports Clinics (14): Silverdale, WA
24. St. Alphonsus Sports Medicine (20): Boise, ID
25. Hulst-Jepsen Physical Therapy (26): Grand Rapids, MI

Neuromuscular Studies, Sportsmetrics™ Training Division

Sportsmetrics™ Programs

Formal Sportsmetrics™

- The original scientifically proven ACL injury prevention program backed by over 20 years of research. Formal Sportsmetrics focuses on teaching proper jump/land mechanics and decreasing lower limb strength deficits. It has 4 components, including a dynamic warm-up, jumps, strength and flexibility, that are performed 3 days a week for 6 weeks.

Sportsmetrics™ Warm Up for Injury Prevention & Performance (WIPP)

- A specially designed warm-up, incorporating the proven components of Sportsmetrics™ for 10-20 minutes of nonstop muscle and joint preparation, plyometrics, strength and flexibility. WIPP also includes agility drills that can facilitate a quick transition into practice and game day activities.

Sportsmetrics™ Return to Play

- For the athlete who has already suffered an injury or had knee surgery, to ensure they are ready for return to their sport. This program includes the fundamentals of the formal Sportsmetrics program in addition to specific objective testing of knee stability, coordination, muscle strength, agility and endurance.

Sportsmetrics™ Agility & Speed

- Offers athletes the same benefits of the original injury prevention program with added benefits of a complex conditioning regimen that can be catered to their sport. The program can be implemented with basketball, soccer, volleyball, tennis and lacrosse for optimal sports performance.

Sportsmetrics™ Female Health Education

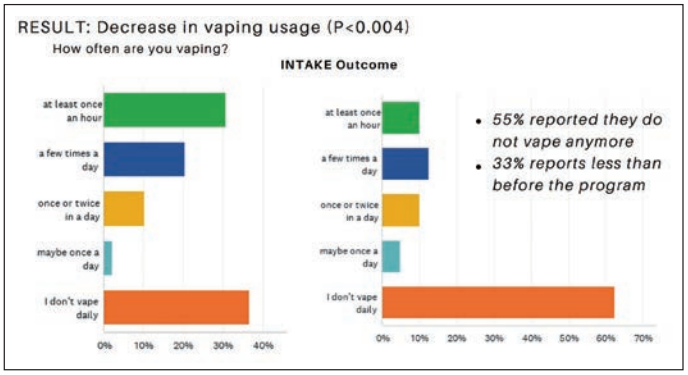
- An educational health initiative with a focus on health issues and considerations specifically relating to female athletes. Topics covered include nutrition, strength training, ACL injuries, bone health, hormones, female athlete triad and more.

Sportsmetrics™ Sports Injury Testing

- Measures several important factors relating to an athlete's strength, coordination and body alignment. This compilation of tests compares the athlete's performance to a large research database of over 800 female athletes. The database is used to understand factors which may predispose an athlete to injury. Testing includes:
  - Video analysis of jump-land mechanics & single leg squat
  - Functional hop tests
  - Vertical jump assessment
  - Core strength, speed, agility & endurance assessments
  - Biodex isokinetic strength assessment (when available)

Sportsmetrics™ Introduction to Athletics

- An introduction to basic movement patterns and exercise safety considerations. This program was developed for the beginner athlete, individuals looking to initiate a more active lifestyle and as a part of our vaping diversion program.
- Our vaping diversion program was created to help schools deter students away from vaping to a healthier alternative. The program includes 30 minutes of vaping education and 30 minutes of health education/physical activity implemented 2 times per week for 6 weeks. In our pilot study, we found statistically significant changes in vaping habits of high school students after completing the program.



Local, National & International Meeting Presentations

Frank R. Noyes, MD

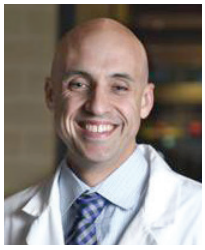
1. Comprehensive Knee Exam: Clinical Rationale and Diagnosis. 36th Annual Advances on the Knee, Shoulder, Hip and Sports Medicine. Hilton Head SC May 28-31, 2022.
2. Factors for Success in ACL Surgery. 36th Annual Advances on the Knee, Shoulder, Hip and Sports Medicine. Hilton Head, SC May 28-31, 2022.
3. Scientific Basis and Development of the Sportsmetrics Neuromuscular Training Program. 36th Annual Advances on the Knee, Shoulder, Hip and Sports Medicine. Hilton Head, SC May 28-31, 2022.
4. Role of Blood Floor Restriction Training in Patients with Chronic Knee Atrophy that have not Responded to Traditional Rehabilitation. 36th Annual Advances on the Knee, Shoulder, Hip and Sports Medicine. Hilton Head SC May 28-31, 2022
5. Arthrofibrosis After Knee Surgery: A Dreaded Complication. 36th Annual Advances on the Knee, Shoulder, Hip and Sports Medicine. Hilton Head SC May 28-31, 2022.
6. Surgical Treatment of PCL and Posterolateral Ligament Injuries. 36th Annual Advances on the Knee, Shoulder, Hip and Sports Medicine. Hilton Head SC, May 28-31, 2022.
7. Role of the High Tibial Osteotomy and Managing the Abnormal Tibial Slope. 36th Annual Advances on the Knee, Shoulder, Hip and Sports Medicine. Hilton Head Sc May 28-31, 2022.
8. Partial Joint Replacement: Unicompartmental and Patellofemoral. 36th Annual Advances on the Knee, Shoulder, Hip and Sports Medicine. Hilton Head, SC May 28-31, 2022.

Samer S. Hasan, MD, PhD

1. Speaker, "Anatomic Shoulder Replacement", Shoulder Conference, University of Cincinnati, Department of Orthopaedic Surgery, December 10, 2021.
2. Panelist, Spotlight on the InSpace Subacromial Balloon Spacer, ASES Annual Meeting, Tampa, Florida, December 16, 2021.
3. Faculty, lab instructor, moderator (first time anterior shoulder dislocation with no glenoid bone loss), and panelist (massive cuff tears, 2cm cuff tear), Current Solutions in Shoulder and Elbow Surgery, Tampa, Florida, February 10-11, 2022.
4. Co-Chair, moderator, and lab instructor, ASES One-Day Open Symposium: Proximal Humerus Fractures - From Repair to Reverse, Tampa, Florida, February 12, 2022.
5. Presenter, "Treatment Options for the Irreparable Rotator Cuff Tear without Pseudoparalysis", Grand Rounds, Department of Orthopaedic Surgery, Northwestern University Feinberg School of Medicine, March 11, 2022.
6. Khan, A., Cronin, K.J., Hill, B.W., Roden, C., Hasan, S.S., Abboud J.A. "Massive Irreparable Rotator Cuff Tears: A Prospective Analysis of Outcomes Following Partial Repair with 2 Year Follow-up." 2022 Annual Meeting of the American Academy of Orthopaedic Surgeons, Chicago, Illinois, March 22-25, 2022.
7. Panelist, "Management of the Walch B2 Glenoid", ASES Specialty Day, Chicago, Illinois, March 26, 2022.
8. Faculty, Moderator,10th Annual Fellows Course in Shoulder Arthroplasty, Tampa, Florida, April 7-9, 2022.
9. Speaker, "Role of the Collagen Patch Augmentation in the Treatment of Rotator Cuff Disease", Smith & Nephew Roundtable, Wichita, Kansas, April 12, 2022.
10. Speaker, "Role of the Collagen Patch Augmentation in the Treatment of Rotator Cuff Disease", Smith & Nephew Roundtable, Tulsa, Oklahoma, May 4, 2022.
11. Panelist, Spotlight on the InSpace Subacromial Balloon Spacer, AANA Annual Meeting, San Francisco, California, May 19, 2022.
12. Hasan, S.S., Zhang, T., Ajayi, A., Hajjar, M., Fleckenstein, C.M. Arthroscopic Repair of Massive Rotator Cuff Tears with and without Collagen Patch Augmentation." 2022 Annual Meeting of the Arthroscopy Association of North America, San Francisco, California, May 19-21, 2022.
13. Faculty, DJO ADVANCE Upper Extremity Chicago Course, Rosemont, Illinois, May 20, 2022.
14. Treatment of SLAP and Bicep Injuries. 36th Annual Advances on the Knee, Shoulder, Hip and Sports Medicine. Hilton Head SC, May 28-31, 2022.
15. New Treatment Options for Massive and Irreparable Rotator Cuff Tears. 36th Annual Advances on the Knee, Shoulder, Hip and Sports Medicine. Hilton Head SC, May 28-31, 2022.
16. Posterior and Multidirectional Instability. 36th Annual Advances on the Knee, Shoulder, Hip and Sports Medicine. Hilton Head, SC May 28-31, 2022.
17. Management of the Young Patient with Shoulder OA. 36th Advances on the Knee, Shoulder and Sports Medicine. Hilton Head, SC May 28-31, 2022.
18. Distal Biceps Tendon Injuries. 36th Annual Advances on the Knee, Shoulder, Hip and Sports Medicine. Hilton Head, SC May 28-31, 2022.
19. Moderator, Stryker InSpace Insider webinar, July 11, 2022.
20. Moderator, "Treatment of the Massive Rotator Cuff Tear", University of Washington Shoulder and Elbow Fellowship Reunion, July 28-29, 2022.
21. Moderator, "Preoperative evaluation", panelist, "Glenoid bone loss", lab faculty, 9th Annual Revision Course in Shoulder Arthroplasty, Tampa, Florida, August 25-26, 2022.
22. Speaker, "Reverse Shoulder Arthroplasty", Shoulder Conference, University of Cincinnati, Department of Orthopaedic Surgery, October 14, 2022.
23. Faculty and speaker, "Humeral fracture management algorithm: hemiarthroplasty vs. reverse: when and why", "Glenoid vs.

humeral lateralization: which is better?", "Treatment options for the irreparable rotator cuff tear: tuberoplasty and partial cuff repair", moderator "Vascular injury during shoulder arthroplasty. Now what?", AAOS/ASES Anatomic and Reverse Total Shoulder Arthroplasty: Concepts and Techniques from Basic to Advanced, Rosemont, Illinois, November 4-5, 2022

24. Speaker, "Update on Treatment of Reparable and Irreparable Rotator Cuff Tears", ASES Symposium for 30th Anniversary Meeting of Argentine Society of Shoulder and Elbow Surgery, November 30, 2022.

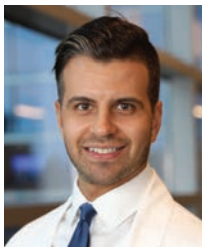


Matthew Busam, MD

1. Acute Shoulder Management on the Athletic Sideline. 7th Annual Mercy Health Athletic Training and Sports Medicine Symposium. Cincinnati, OH June 3, 2022

Michael Palmer, MD

1. Posterior Hip and Gluteus Hip Pain. 36th Annual Advances on the Knee, Shoulder, Hip and Sports Medicine. Hilton Head, SC May 28-31, 2022.



Mahmoud Almasri, MD

1. ESSKA 20th Congress European Society of Sports Traumatology, Knee Surgery & Arthroscopy Presenter & Attendee. Paris, France. April 2022
2. Treatment of Hip Labral Tears and FAI. 36th Annual Advances on the Knee, Shoulder, Hip and Sports Medicine. Hilton Head, SC May 28-31, 2022.
3. Practical Course: Hip Conditions in the Young Adult International Course - chaired by McMaster University, Hamilton, Ontario. May 2022
4. ISHA – The Hip Preservation Society Annual Scientific Meeting Presenter & Attendee Glasgow, UK. October 2022

Ankit Bansal, MD

1. Reverse Shoulder Arthroplasty for Massive Cuff Tears and Cuff Arthropathy. 36th Annual Advances on the Knee, Shoulder, Hip and Sports Medicine. Hilton Head, SC May 28-31, 2022.
2. Hip Arthroscopy in the Setting of Dysplasia. 36th Annual Advances on the Knee, Shoulder, Hip and Sports Medicine. Hilton Head, SC May 28-31, 2022.

Brian Chilelli, MD

1. Evaluation and Preoperative planning. Arthroscopy Association of North America (AANA) Fellowship Education Webinar Series, Cartilage Restoration. March 29, 2022.
2. Why Stages Treatment for Cartilage Pathology. Vericel MACI: Work or ART program virtual event. Work of ARThroscopy. April 19, 2022.
3. ACL Graft Choices for the Young Athlete. Podium presentation. Arthroscopy Association of North America (AANA) Annual Meeting, San Francisco, CA. May 19 2022.
4. MCL Injuries: Diagnosis and Treatment. 36th Annual Advances on the Knee, Shoulder, Hip and Sports Medicine. Hilton Head, SC May 28-31, 2022.
5. Cartilage Restoration Techniques. 36th Annual Advances on the Knee, Shoulder, Hip and Sports Medicine. Hilton Head, SC May 28-31, 2022.
6. Presentation and Moderator, American Academy of Orthopaedic Surgeons (AAOS) webinar. Complex Revision ACL Cases I Encounter Too Frequently. July 20, 2022.
7. Matrix-assisted autologous chondrocyte implantation: Introduction and surgical technique. Surgical Demonstration. Arthroscopy Association of North America (AANA), Advanced Knee Course. Rosemont, IL. September 9-10, 2022.
8. Matrix-assisted autologous chondrocyte implantation: Introduction and surgical technique. Surgical Demonstration, American Academy of Orthopaedic Surgeons (AAOS)Advanced Techniques in Knee: Cartilage, Ligaments, Osteotomy, Meniscus, and More Course. Rosemont, IL. October 13-15, 2022.
9. Biologic Augmentation of White-Red Meniscal Repairs: Current Options and What is the Evidence? Podium presentation. American Academy of Orthopaedic Surgeons (AAOS)Advanced Techniques in Knee: Cartilage, Ligaments, Osteotomy, Meniscus, and More Course. Rosemont, IL. October 13-15, 2022.
10. Revision ACL-Considerations to Maximize Successful Outcomes. Podium presentation. American Academy of Orthopaedic Surgeons (AAOS)Advanced Techniques in Knee: Cartilage, Ligaments, Osteotomy, Meniscus, and More Course. Rosemont, IL. October 13-15, 2022.
11. Orthobiologics Injections in the Knee (BMAC, Amniotic, Fat): What's Appropriate Based on the Evidence? Podium presentation. American Academy of Orthopaedic Surgeons (AAOS)Advanced Techniques in Knee: Cartilage, Ligaments, Osteotomy, Meniscus, and More Course. Rosemont, IL. October 13-15, 2022.

Andrew Kalthoff, MD

1. Modern Surgical Management of Athletic Shoulder Injuries. Mercy Health Athletic Training & Sports Medicine Symposium. Cincinnati, OH June 3, 2022.

Advances on the Knee, Shoulder, Hip and Sports Medicine Conference

This three and one-half day course provides presentations on the latest controversies and clinical, surgical, and rehabilitation recommendations for knee, shoulder, hip, and sports medicine problems. Cincinnati SportsMedicine has long recognized the collaborative efforts of orthopaedists, physical therapists, athletic trainers and many other health professionals to successfully diagnose and treat musculoskeletal problems.

In 1986, in conjunction with the American Academy of Orthopaedic Surgeons, Cincinnati SportsMedicine Research & Education Foundation co-sponsored a continuing medical education program for orthopaedic medical specialists with the emphasis on the diagnosis and treatment of knee, shoulder, and sports medicine problems. Sponsored by Cincinnati SportsMedicine Research and Education Foundation, this program has evolved into one of the premier continuing education programs in the country, with an internationally recognized guest faculty.

The Annual Advances on the Knee, Shoulder, Hip and Sports Medicine Conference is one of the few comprehensive continuing education courses that includes clinical, surgical, and rehabilitation techniques for knee, shoulder, elbow, hip, and sports medicine pathology. Our internationally recognized, multi-disciplinary faculty share their experiences, research, and clinical outcomes to stimulate medical professionals to rethink their approach to many musculoskeletal challenges.

We are BACK!! After a 2-year hiatus, our 2022 Advances on the Knee, Shoulder, Hip, and Sports Medicine Course returned to the Sonesta Resort on Hilton Head! Over 200 course participants, faculty, and exhibitors gathered over Memorial Day weekend to listen to and participate in lively discussions in the treatment of knee, hip, shoulder, and sports medicine related injuries. It was amazing to be back to our in-person format!

2022 Course Faculty:

Frank R. Noyes, MD
Jay C. Albright, MD
Mahmoud Almasri, MD
Ankit Bansal, MD
Sanjeev Bhatia, MD
Brian J. Chilelli, MD
Jeffrey R. Dugas, MD
Marc T. Galloway, MD
Samer S. Hasan, MD, PhD
Michael P. Palmer, MD
Anthony A. Romeo, MD
Edward W. Wojtys, MD
Imad Abushahin, MD
Nedal Alkhatib, MD
Naji Madi, MD
Ting Zhang, MD
Timothy P. Heckmann, PT, ATC
George J. Davies, DPT, MED
Matthew D. Gingras, PT, DPT, OCS
Julie Jasontek, PT, MHS
Russell M. Paine, PT
Kevin E. Wilk, DPT
Darryl Yardley, PT, MScPT
Carolyn T. Meder, ATC
Stephanie L. Smith, MS

Sports Medicine Fellowship Program

Cincinnati SportsMedicine and Orthopaedic Center was one of the first Centers in the country to offer sports medicine fellowship training and since 1978 has worked to create one of the most comprehensive programs available. Our staff is dedicated to maintaining this high standard of excellence. Over 168 distinguished fellows have graduated from our program and are now in practice environments including private group practice, hospital- based institutions and academic practices.

In January 2019, The Jewish Hospital Graduate Medical Education (GME) department became the sponsoring institution for our fellowship program. 2022 represented the 4th year of institutional sponsorship by The Jewish Hospital Graduate Medical Education (GME) for our sports medicine fellowship. The partnership, direction, and collaboration with the Jewish Hospital GME continues to provide valuable resources for our fellows, faculty, and staff.

Fellows who train at our Center receive extensive experience in surgery, clinic, academics, and research. The training is accomplished through busy surgical and clinical practices, bio skills laboratories, rehabilitation exposure, on-the-field team coverage, formal weekly teaching conferences, monthly journal clubs, and research projects. The highly structured program includes didactic lectures on sports medicine, indications and complications, rehabilitation, anatomy, and biomechanics. All of the physicians at Cincinnati SportsMedicine and Orthopaedic Center — Mercy Health are very dedicated to the educational program. The fellows consistently praise the surgical and clinical experience they received during their time in Cincinnati. The rehabilitation and athletic trainer faculty are also dedicated to the program and provide a unique educational experience.

Personnel: Frank R. Noyes, MD – Fellowship Director, Michael S. Laidlaw, MD, Marc T. Galloway, MD, Samer S. Hasan, MD, PhD, Matthew L. Busam, MD, Michael P. Palmer, MD, Brian Chilelli, MD, Mahmoud Almasri, MD, Ankit Bansal, MD, Andrew Kalthoff, DO, Cassie Fleckenstein, and Teresa Wood

Studies Completed

1. Clinical and MRI Outcomes of Patients Undergoing Repair of Large and Massive Rotator Cuff Tears with Collagen Patch Augmentation: A Retrospective Cohort Study
2. Results of Prosthetic Shoulder Arthroplasty in Patients Under Age 40
3. Distribution of Shoulder Replacement Among Surgeons and Hospitals
4. Shoulder Arthroscopy Following Shoulder Replacement Surgery: Systematic Review
5. Anterior Cruciate Ligament Graft Conditioning Required to Prevent an Abnormal Lachman and Pivot Shift after ACL Reconstruction: A Robotic Study of 3 ACL Graft Constructs
6. Instructional Video – Anterior Closing Wedge Osteotomy to Correct Abnormal Tibial Slope Prior to ACL Reconstruction
7. Reverse Shoulder Arthroplasty in Patients 90 Years Old or Greater

Publications

1. Chaudry Z., Almasri M., Hasan, S.S., "Addressing Arthroscopic-Assisted Acromioclavicular Joint Reconstruction in the Beach Chair Position with Concomitant Labral Pathology in the Lateral Decubitus Position", Arthrosc Tech., 2022 Apr:11(5):e847-e855.
2. Almasri, M., Kohrs, B., Fleckenstein, C.M., Nolan, J., Wendt, A., Hasan, S.S. "Reverse Shoulder Arthroplasty in Patients 85 Years and Older is Safe Effective and Durable", J Shoulder Elbow Surg., 2022 May 9;S1058-2746(22)00423-2.61.
3. Hasan, S.S., Schwindel L.E., Fleckenstein, C.M., "Prosthetic shoulder arthroplasty in patients 40 years or younger: outcomes stratified by diagnosis and surgery", Clin Shoulder Elbow, November 16, 2022. doi: https://doi.org/10.5397/cise.2022.01088

Manuscript In Preparation, Under Review, In Press

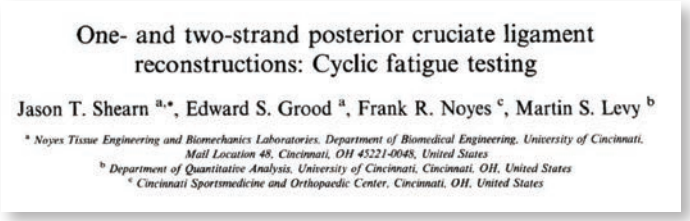
1. Zhang T, Crampton CT, Smith SL, Noyes FR. Hamstring strengthening exercises with objective measurements to adopt in neuromuscular training program for female athletes: a narrative review. Under review, Journal of Orthopaedic Sports Medicine, 2022.
2. Hasan SS, Ziegler R. Arthroscopic removal of loose glenoid components: case report and technique video. In preparation, 2022.
3. Almasri M, Zhang T, Swift B. Endoscopic abductor repair of the hip simplified: double-pulley suture passage free technique. In preparation, 2022.
4. Hasan SS, Zhang T, DeBernardis D. Total shoulder replacement in patients greater than 80 years old: systematic review. In preparation, 2022.
5. Hasan SS, Zhang T, Adedapo A, Hajjar M, Wendt A, Nolan J, Fleckenstein CM. Early outcomes following arthroscopic repair of large and massive rotator cuff tears augmented with a bio-inductive collagen scaffold. In preparation, 2022.
6. Zhang T, Choudhury S. Hybrid of Smith-Peterson and Watson-Jones minimally invasive direct anterior approach to the hip joint. In preparation, 2022.

Current Studies

1. Women's Sports Medicine Initiative
2. Review of Neuromuscular Training Programs: Systematic Review
3. Total Shoulder Arthroplasty in Patients >80 Years Old: Systematic Review
4. Fat Pad Resection: Indications and Clinical Outcomes

University of Cincinnati Department of Biomedical Engineering

Collaboration with the University of Cincinnati Department of Biomedical Engineering continued into its 45th year. This department was co-founded in 1975 by Drs. Frank R. Noyes and Edward S. Grood as one of the first bioengineering departments in the United States. The collaborative efforts of engineers and orthopaedic surgeons has resulted in the highest honors and awards in orthopaedic research. Awards received by the scientists and orthopaedic surgeons in the Department of Biomedical Engineering include the Orthopaedic Research and Education Foundation (OREF) Clinical Research Award for Outstanding Orthopaedic Clinical Research, and three Kappa Delta Awards from the American Academy of Orthopaedic Surgeons (AAOS). Prestigious awards have also been received from the American Orthopaedic Society for Sports Medicine (AOSSM) and the Orthopaedic Research Society (ORS).


One- and two-strand posterior cruciate ligament reconstructions: Cyclic fatigue testing

Jason T. Shearn [a,*], Edward S. Grood [a], Frank R. Noyes [c], Martin S. Levy [b]

[a] Noyes Tissue Engineering and Biomechanics Laboratories, Department of Biomedical Engineering, University of Cincinnati, Mail Location 48, Cincinnati, OH 45221-0048, United States
[b] Department of Quantitative Analysis, University of Cincinnati, Cincinnati, OH, United States
[c] Cincinnati Sportsmedicine and Orthopaedic Center, Cincinnati, OH, United States


RESEARCH ARTICLE

Determine the vertical ground reaction forces and knee mechanics with different gait inclinations in the sheep model

Rebecca J. Spatholt[1] | Chelsea E. Minoughan[1] | Cynthia Gooch[1] | Samuel P. Harms[2] | Michal L. Taylor[3] | Marc T. Galloway[4] | Jason T. Shearn[1]


CURRENT CONCEPTS REVIEW

The Role of Mechanical Loading in Tendon Development, Maintenance, Injury, and Repair

Marc T. Galloway, MD, Andrea L. Lalley, BS, and Jason T. Shearn, PhD

Investigation performed at the Cincinnati Sports Medicine and Orthopaedic Center, and the Engineering Research Center, University of Cincinnati, Cincinnati, Ohio


Primary and Secondary Restraints of Human and Ovine Knees for Simulated In Vivo Gait Kinematics

Rebecca J. Nesbitt[1], Safa T. Herfat[2], Daniel V. Boguszewski[3], Andrew J. Engel[1], Marc T. Galloway[4], and Jason T. Shearn[1]

The Department of Biomedical Engineering was reformed in 2017 and has research focus areas in medical device design, medical imaging & bioinformatics, and regenerative medicine & biomechanics. The Department recently published the results of a study to determine the vertical ground reaction forces and knee mechanics with different gait inclinations in a sheep model. In addition, there are currently two orthopaedic related NIH grants under review, 1) Examining the role of Col12s1 in natural tendon healing using proteomics, transcriptomics, and biomechanics, 2) Examining the cellular and transcriptomic differences in regenerative versus inferior tendon healing.

In August 2020, the Department welcomed Thomas Talavage, PhD as the new Chair. Since 2017, it has grown to include 23 primary and 36 secondary faculty members. During this past year, the Department of Biomedical Engineering added one new faculty member and 2 faculty members that transitioned from other departments within UC. In addition, there are 394 undergraduate students and 62 graduate students in the various programs offered by the Department of Biomedical Engineering.

Given the long-standing relationships between Cincinnati SportsMedicine Research and Education Foundation and the University of Cincinnati Department of Biomedical Engineering, Drs. Noyes and Grood are currently mentoring, in collaboration with Dr. Jason Shearn, PhD student Rebekah Deardurff. Rebekah is a third year PhD student examining the role of posterior structures on knee hyperextension. In 2023, we will look to extend our collaborations with the department faculty in order to continue innovative and groundbreaking research. These programs will have a translational application to the treatment of orthopaedic and sports medicine disorders.

2022 Event Photos

Fellowship Graduation

The Jewish Hospital — Mercy Health Gala

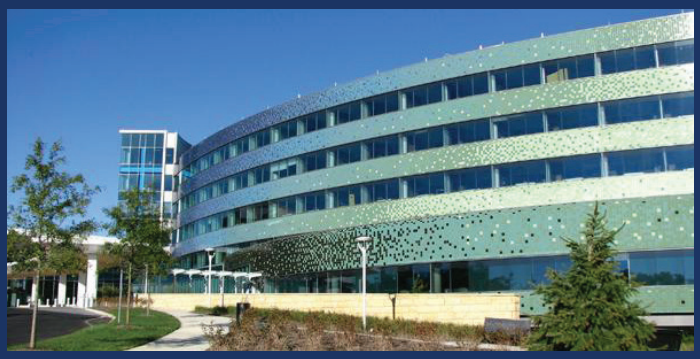
Cincinnati SportsMedicine
Research & Education Foundation

Noyes Knee Institute

Mercy Health — Orthopaedics and
Sports Medicine Institute

The Jewish Hospital — Mercy Health

Mercy Health — Fairfield Hospital



Mercy Health — West Hospital

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