2020 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

Welcome to the 2020 Annual Report that showcases the major advances of all Divisions within our organization that have collectively provided a most successful and productive year. The Cincinnati Sports Medicine Research and Education Foundation is the parent organization for our education and research programs. Over four decades, we 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 occupations.

Our mission is to provide expert compassionate care to our patients by providing peace of mind in the expertise of our surgeons, rehabilitation, and clinic staff. We have published the most advanced research on clinical outcomes for musculoskeletal injuries and disorders. As a Foundation we have established educational curriculum and programs and have trained thousands of specialists world-wide. We wish to thank all of 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 orthopaedic textbooks, and trained 163 sports medicine and arthroscopic surgeons in our fellowship program that now have active orthopaedic practices throughout the United States.

The Noyes Knee Institute was founded to advance the goals in the clinical treatment and long-term clinical outcome registry studies for many specific knee ligament and other knee disorders. Now there are similar registry studies and programs for shoulder disorders, hip disorders, orthobiologics and sports medicine that are featured in this 2020 report. The physicians associated with the Foundation strive, through research and clinical practice, to develop state-of-the art surgical techniques and treatment options that represent the most advanced procedures available world-wide.

A 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 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 on training athletes and implementing the Sportsmetrics™ program in their communities. Sportsmetrics™ is the largest sports injury prevention program in the world and is described in detail in this report.

We appreciate the many 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 Orthopaedic Center.

The Foundation was established with the goal of bringing together surgeons, therapists, 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 Orthopaedic Surgeons (Kappa Delta Award), the Orthopaedic Research and Education Foundation's Clinical Research Award, and the American Orthopaedic 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.

2020 presented many challenges as we navigated COVID-19. Due to the severity of the virus, we were forced to cancel our annual Advances on the Knee, Shoulder, Hip, and Sports Medicine Conference. Our annual conference, now in its 34th year and featured in this report, has trained thousands of physicians, physical therapists, and athletic trainers world-wide. For 2021 the Advances Conference is a scaled down virtual presentation and will return to a live, in-person national conference for 2022!

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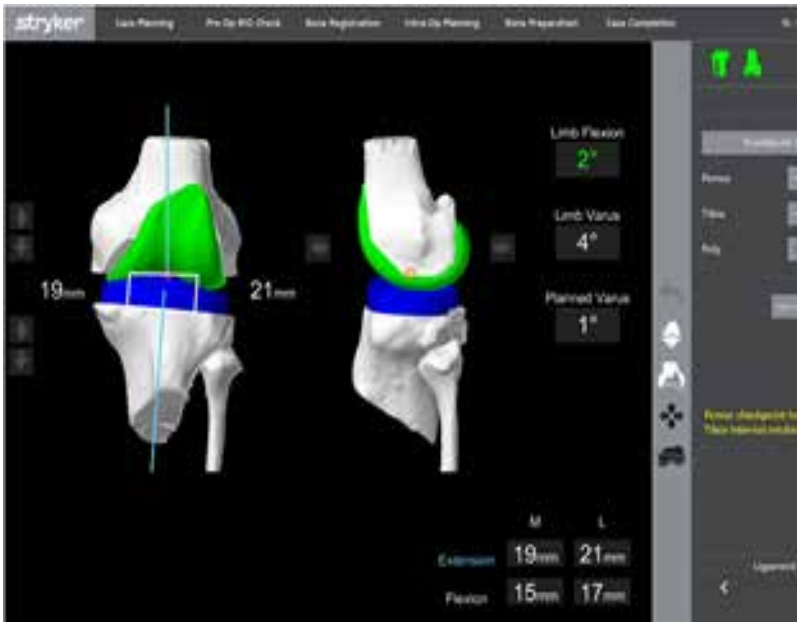
Our Mission

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.

2020 Accomplishments

Research and education advances are represented by the collaboration of physicians, scientists and research staff at Mercy Health – Cincinnati SportsMedicine and Orthopaedic Center, Cincinnati SportsMedicine Research and Education Foundation, Noyes Knee Institute, and the University of Cincinnati Department of Biomedical Engineering.



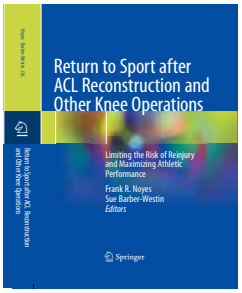
- Recruitment and hiring of three faculty members.

Dr. Mahmoud Almasri – Dr. Almasri, a 2020 graduate of our sports medicine fellowship, joins us after a 6-month hip fellowship at McMaster University in Ontario, Canada. Dr. Almasri specializes in hip arthroscopy and is the director of the Cincinnati Hip Preservation Center. Dr. Almasri is part of the core faculty for our sports medicine fellowship program.

Dr. Ankit Bansal – Dr. Bansal joins our Foundation as an Adjunct Faculty member. Dr. Bansal specializes in adult reconstructive hip and knee surgery and shoulder surgery. His expertise will provide an asset to our fellowship program.

Dr. Brian Chilelli – Dr. Chilelli accepted a full-time clinical and faculty position with our group. Dr. Chilelli specializes in cartilage restoration procedures of the knee. When he isn't in clinic, working on research, or teaching our fellows, you can find Dr. Chilelli on the sidelines as the head team orthopaedic surgeon for Miami University in Oxford, Ohio.

- Publication of Dr. Noyes' textbook "Return to Sports After ACL Reconstruction and Other Knee Operations". This textbook includes 30 chapters and provides an in-depth review on safely returning athletes to sports after knee surgery.



- Dr. Busam completed his second season as the Chief Medical Officer for FC Cincinnati of MLS.

Education

- Physicians gave over 15 virtual presentations to the international, national, regional, and local orthopaedic communities.
- 60 teaching conferences attended in-person and virtually by fellows, physical therapists, athletic trainers, physical therapy students and athletic training students.
- 12 in-person and virtual journal clubs attended by staff physicians and fellows.
- Navigation to a virtual learning environment during the COVID-19 pandemic.

Fellowship

- Nationally acclaimed sports medicine, knee, and shoulder fellowship program.
- Under the direction of Dr. Samer S. Hasan, the Cincinnati Shoulder and Elbow Fellowship graduated its first fellow and welcomed a new fellow for the 2020-2021 academic year.
- ACGME/RRC accreditation; recognized by the American Orthopaedic Society for Sports Medicine and the Arthroscopy Association of North America.
- 163 fellow graduates (1979-2020) practicing across the United States and Canada.
- Expansion of fellowship faculty to include Drs. Mahmoud Almasri, Ankit Bansal, Brian Chilelli.

Sportsmetrics™

- Greater than 50 athletes trained in 2020. Many of these sessions were conducted virtually.
- Certification: 79 individuals were certified. This was completed by integrating a virtual learning platform that allowed for the continuation of a hands-on learning environment.
- Courses held in Cincinnati, OH and Grand Rapids, MI.

Director Statements

Frank R. Noyes, MD
Medical Director

The Foundation and patient care initiatives in 2020 continued on a very active and expanding pathway with major accomplishments in every Division, which are highlighted in this annual report. I am exceedingly proud of all the professional highlights in this annual report. The enthusiasm and continued excellence of our physician, rehabilitation, administrative, and research staff are a personal delight and wonderful experience as we work together so closely month-after-month in a truly wonderful research and teaching environment.

The ongoing and new 2020 clinical studies, surgical approaches, rehabilitation and other research advances are presented in this report. New research initiatives in the shoulder, knee, hip, injury prevention and performance occurred in 2020. I hope you will enjoy this summary of the many accomplishments of the Foundation and accompanying organizations represented in this report.

We are now in our seventh year of integration of Cincinnati SportsMedicine and Orthopedic Center and 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 that has endorsed and supported our clinical research and educational programs through a joint operating agreement. In 2020, the Cincinnati Shoulder and Elbow Fellowship under the co-direction of Dr. Samer Hasan continued to be highly successful with multiple applications for training. In addition to his role with the Shoulder and Elbow Fellowship, Dr. Hasan was appointed Regional Medical Director, Orthopaedic Service Line, Bon Secours Mercy Health and Chair, Orthopaedic and Sports Medicine Service Line, Mercy Health Cincinnati. The Shoulder Division under Dr Hasan's direction continued to have a highly successful year with new and continued clinical studies that are showcased in this report.

In 2020, the Foundation was pleased to announce the addition of three new clinical faculty. Mahmoud Almasri, MD graduated from our Fellowship in 2020. After completing a six month a Hip Fellowship at McMaster University, Dr. Almasri accepted a clinical and faculty position with Cincinnati SportsMedicine and Orthopaedic Center – Mercy Health and is the Director of the Cincinnati Hip Preservation Center. Dr. Almasri and our adjunct faculty, Michael Palmer, MD, provide an excellent teaching experience for our Fellowship. We are also pleased to announce that Brain Chilelli, MD has accepted a full-time clinical and faculty position and is the new Head Team Orthopaedic Surgeon at Miami University in Oxford, Ohio. Dr. Chilelli completed his fellowship training at Brigham and Women's Hospital, Harvard Medical School. Prior to joining Cincinnati SportsMedicine and Orthopaedic Center – Mercy Health, Dr. Chilelli spent the last seven years as an orthopaedic surgeon with Northwestern Medicine Regional Medical Group in Warrenville, Illinois. Dr. Chilelli has a special expertise and is nationally involved in knee cartilage restoration and will serve as the Director of the Knee Restoration and Orthobiologics division. A third addition to our Adjunct Faculty is Ankit Bansal, MD. Dr. Bansal completed two fellowships, one in shoulder at Johns Hopkins University and a second in hip and knee reconstruction at the Orthopaedic Centers of Colorado. Dr. Bansal specializes in adult reconstructive hip and knee surgery and shoulder surgery. His expertise will provide an asset to our fellowship program.

We wish to provide special recognition to our orthopedic surgeons and athletic trainers that provide a very robust program as orthopaedic team physicians at multiple high schools, elite teams, and now with Dr. Chilelli at Miami University. A special acknowledgment for Marc Galloway, MD in his 11 years as Head Team Physician for the Cincinnati Bengals and his continued role as Director of the Bon Secours Mercy Health Sports Medicine Committee. We are also pleased to acknowledge the appointment of Matt Busam, MD as Chief Medical Officer for FC Cincinnati MLS. Working as the physician of professional athletic teams represents an extraordinary commitment in addition to an active orthopaedic practice.

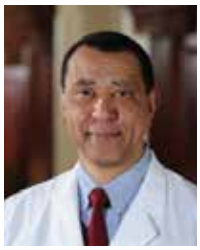
We offer sports medicine and specialty clinics at six Centers throughout the Cincinnati and Northern Kentucky region. Our patients are offered the advantage to enroll in advanced treatment programs in all disciplines. One goal for 2021 is to increase our collaboration with the University of Cincinnati Department of Biomedical Engineering. This relationship has spanned an amazing 40 plus years of collaboration between scientists and clinicians.

We continue to provide a nationally recognized Sports Medicine and Arthroscopy Fellowship program to train orthopaedic surgeons on advanced specialized treatment programs and surgery. Our faculty and staff provide the highest professionalism and dedication to this mission. The achievements of our fellows in 2019-2020 are provided. Our fellows work closely with our full-time staff and have major commitments to clinical and robotic research studies. We are pleased to have the opportunity to collaborate with medical and hospital organizations and universities across the United States in combined 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

Thomas N. Lindenfeld, MD
Sports Medicine Fellowship Faculty, Cincinnati SportsMedicine and Orthopaedic Center – Mercy Health; Clinical and Research Faculty, Cincinnati SportsMedicine Research and Education Foundation



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, 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

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

2019-2020 Fellows


Mahmoud Almasri, MD


Andrew Crapser, MD


Nathan Krebs, DO


Trevor Stefanski, MD


Marion Swall, MD

2020-2021 Fellows


Dane Bolton, DO


Zubair Chaudry, MD


Dan Johnson, DO


Andrew Kalthoff, DO

Foundation Staff


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


Sue Barber-Westin, BS
Director, Clinical Research,
Noyes Knee Institute


Cassie Fleckenstein, MS
Manager,
Clinical Research


Jennifer Riccobene, BA
Research Coordinator


Debbie Hartwig
Administrative Assistant


Tommy Campbell, BA
Director of Marketing,
Noyes Knee Institute
& Sportsmetrics™


Stephanie Smith, MS
Manager,
Sportsmetrics™ Program


Teresa Wood
Fellowship Coordinator/
Administrative Assistant

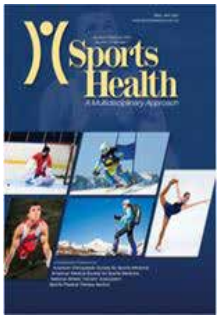

Lauren Huser, MEng
Consultant

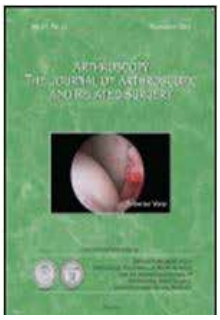

Carolyn Meder ATC
Sportsmetrics™
Athletic Trainer

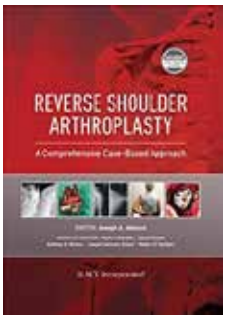

Lindsey Sipes ATC
Research Coordinator

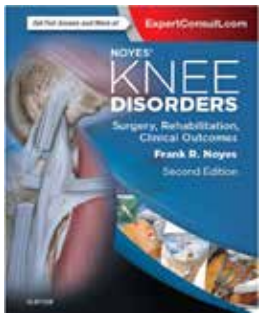

Olivia Clark, BA
Biomechanical Research
Associate

2020 Journal Publications and Textbook Chapters



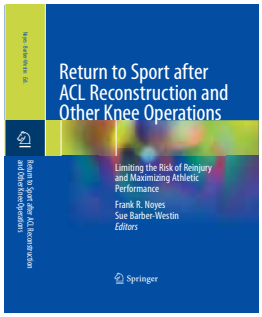






Noyes' Knee Disorders: Surgery, Rehabilitation, Clinical Outcomes – This textbook is an unparalleled resource on the diagnosis, management, and outcomes analysis for the full range of complex knee disorders.

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, orthopaedics 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 Orthopaedic Knee Research	2011	• 49 Journals: World-Wide Publications, 1945-2014 • Dr. Noyes cited as second leading author: 6 of 100 publications
Frank R. Noyes, MD	Arthroscopy	The 25 Most-Cited Articles in Arthroscopic Orthopaedic Surgery	2012	• 61 Journals: World-Wide Publications, 1980-2009 • Dr. Noyes cited as leading author: 6 of 25 publications
Frank R. Noyes, MD	Orthopedics	Fifty Most-Cited Articles in Anterior Cruciate Ligament Research	2015	• 11 Journals, English; World-Wide Publications, 1980-2013 • Dr. Noyes cited as the leading author: 4 of 50 publications
Samer S. Hasan, MD, PhD	Journal of Surgical Orthopaedic Advances	Trends and Characteristics of Highly Cited Articles in Shoulder Arthroplasty	2019	• 1972-2011
Samer S. Hasan, MD, PhD	International Journal of Orthopaedics	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: Sue Barber-Westin, Cassie Fleckenstein, Jennifer Riccobene, Lindsey Sipes

Publications

1. Hohmann E., Noyes F.: Degenerative meniscus lesions: an expert consensus statement using the modified Delphi technique. *Arthroscopy* 36:501-512, 2020.
2. Barber-Westin SD, Noyes FR: One in 5 athletes sustain reinjury upon return to high-risk sports after ACL reconstruction: A systematic review in 1,239 athletes younger than 20 years of age. *Sports Health* 12: 587-597, 2020.
3. Noyes FR: Editorial commentary: Long-term survivorship of knee meniscal transplant surgery - the importance of patient-reported outcomes with magnetic resonance imaging demonstration of retained meniscal transplant function. *Arthroscopy* 8: 2275-2278, 2020.
4. Noyes FR: Editorial commentary: Measurements for successful high tibial osteotomy: understanding supine versus standing and intraoperative fluroscopic alignment is required. *Arthroscopy* 36: 1665-1669, 2020.

Textbook chapters

In 2020, we proposed and worked on a new textbook, Critical Rehabilitation for Partial and Total Knee Arthroplasty - Guidelines and Objective Testing to Allow Return to Physical Function, Recreational and Sports Activities, Noyes FR, Barber-Westin SD (eds), Springer, Basel, Switzerland, to be published in 2021.

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 in 2020:

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 Rehabilitation 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, Huser LE, Palmer M: A biomechanical study of pivot-shift and Lachman translations in ACL-sectioned, ACL-reconstructed and with partial ACL graft slackening: instrumented Lachman tests statistically correlate and supplement subjective pivot-shift tests. In press, *Arthroscopy* 2021.
2. Krebs NM, Barber-Westin S, Noyes FR: Generalized joint laxity is associated with increased failure rates of primary anterior cruciate ligament reconstructions: A systematic review. In press, *Arthroscopy*, 2021.
3. Noyes FR, Barber-Westin SD, Sipes L: Blood flow restriction training can improve peak torque strength in chronic atrophic postoperative quadriceps and hamstrings muscles. In press, *Arthroscopy*, 2021.

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. Blood Flow Restriction Training for Severe Muscle Atrophy: Under the direction of Dr. Noyes, our research team is evaluating strength gains following utilization of blood flow restriction (BFR) training for muscle atrophy. Patients with severe muscle atrophy are enrolled into this prospective study and follow a very specific training program. The BFR training program consists of 9 visits over a 3 to 4-week period. Strength is measured prior to training and at the conclusion of the 9 visits.
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. ACL Revision with Tibial and/or Femoral Tunnel Bone Grafting: The purpose of this prospective study is to evaluate and report the clinical outcomes for patient who have undergone an ACL revision procedure with staged tibial and/or femoral tunnel bone grafting. Decrease in pain, increase in function, stability, and return to activity will be evaluated.
7. 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.
8. 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.
9. 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.
10. Distal Femoral Osteotomy for Valgus Malalignment in Young Patients: Clinical outcomes of pain, swelling, stability, function, and return to activity will be evaluated and reported in patients who undergo a distal femoral osteotomy. Patients will have a comprehensive knee exam and will complete patient reported outcome measures pre-operatively and again at designated time points after surgery.

Knee Division:

In 2020, the Knee Division completed a study of TOTAL KNEE REPLACEMENT surgery performed by Dr. Frank Noyes in younger patients who had been active in recreational sports and expected to return to these activities after surgery. The goal of the surgery and post-operative rehabilitation was to utilize an individualized rehabilitation program that extended over many months to return muscle strength from the months of disuse prior to surgery and to regain function for more strenuous activities. A major emphasis of the program was to return patients to an active lifestyle including the ability to perform American Heart Association guidelines of a return to aerobic type activities known for strongly decreasing the incidence of heart disease, diabetics, cancer, stroke and depression. We were pleased to submit the study for publication with one of the highest patient successful outcomes ever published. The patients rated the Knee Center and Rehabilitation with a 96% overall satisfaction rate. The study abstract and specific outcome measures are shown below.

Return to Physical Activities and Aerobic Fitness after Total Knee Arthroplasty in Younger Patients. The Effect of an Individualized Patient Approach

Frank R. Noyes, MD

Timothy Heckmann, PT, ATC

Sue Barber-Westin, BS

Under review, International Orthopaedics, 2021

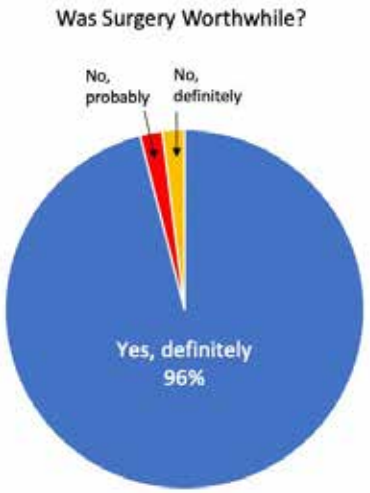
Abstract

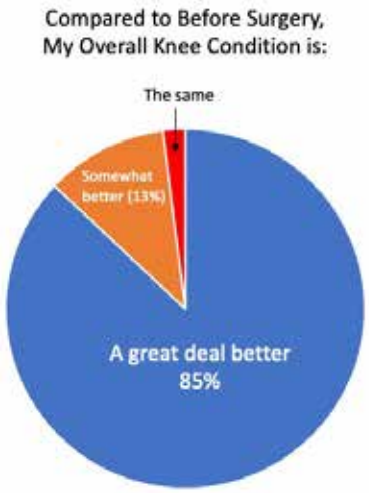
Purpose The ability to resume physical activities and a healthy lifestyle without symptoms after total knee arthroplasty (TKA) remains unclear because studies show high rates of patient dissatisfaction. This study evaluated whether a goal-centered rehabilitation protocol led to high rates of resumption of physical activities and satisfaction after TKA.

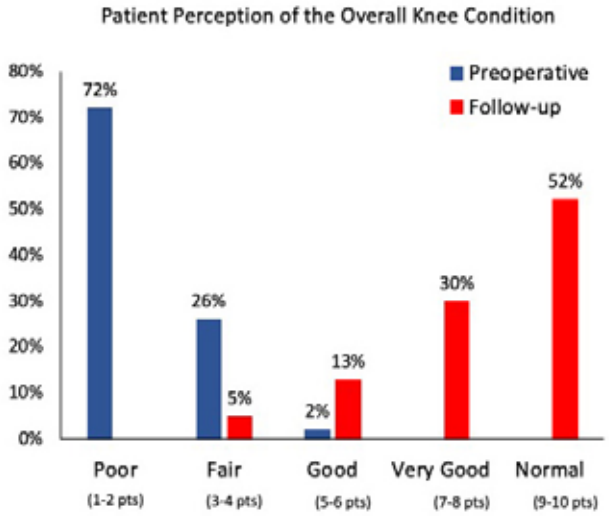
Methods We evaluated 51 patients (54 knees, mean age 58 + 7 years) a mean of 4.4 + 0.5 years after TKA. A perioperative comprehensive program was used, with individual counselling and setting of patient expectations and goals. Outcomes were evaluated with KOOS JR. Questions from the VR-12 Health Survey and others related to patient symptoms, expectations, physical activities, and aerobic fitness were also recorded.

Results We found good to excellent patient outcomes, with statistically significant improvements in KOOS JR, overall knee condition, pain, and swelling scores ($p < 0.0001$). A mean of 14 + 6 postoperative therapy sessions and a home exercise program up to 12 months were required to correct muscle deficits and monitor symptoms with return to physical activities. On follow-up, 86% of patients resumed low-impact physical activities, 85% achieved aerobic fitness guidelines, and 96% expressed overall satisfaction. There were no differences between genders for any factor analyzed. There were no complications, blood transfusions, infections, or instances of knee instability.

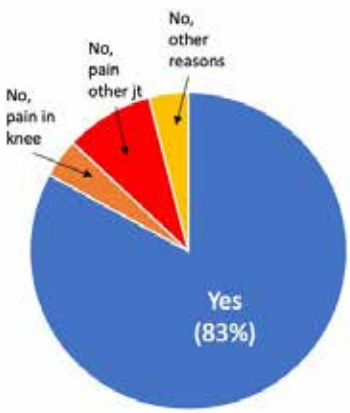
Conclusion A high satisfaction rate and return to physical and aerobic activities was achieved after TKA in younger, athletic patients following a comprehensive rehabilitation program that restored function.


Was Surgery Worthwhile?
No, probably
No, definitely
Yes, definitely
96%


Compared to Before Surgery, My Overall Knee Condition is:
The same
Somewhat better (13%)
A great deal better
85%


Patient Perception of the Overall Knee Condition
Preoperative
Follow-up
80%
70%
60%
50%
40%
30%
20%
10%
0%
72%
26%
5%
2%
13%
30%
52%
Poor (1-2 pts)
Fair (3-4 pts)
Good (5-6 pts)
Very Good (7-8 pts)
Normal (9-10 pts)


Ability to Take Brisk 20-Minute Walk 5 Days/Week
No, other reasons
No, pain other jt
Yes (28%)
No, pain in knee (69%)
Preoperative


No, other reasons
No, pain other jt
No, pain in knee
Yes (83%)
Follow-up

Shoulder Division: Clinical Outcome Studies & Applied Clinical Research

Under the direction and leadership of Dr. Samer Hasan and with contributions by Drs. Thomas Lindenfeld, Marc Galloway, and Matthew Busam our Center is a destination for patients seeking quality non-operative and operative treatment for their shoulder and elbow injuries. Our physicians are involved in cutting edge research and technological advances. Our physicians are also reviewers and editors for various print and online publications.

In 2020, Dr. Hasan was inducted as a member of the Neer Circle of the American Shoulder and Elbow Surgeons (ASES). The mission of the Neer Circle is to "recognize service and leadership, strategically support our society, and advance the practice of shoulder and elbow surgery through consensus" (American Shoulder and Elbow Surgeons). This prestigious honor is bestowed on long standing ASES members who devote their time and talents to the mission of the society.

In addition to being inducted into the ASES Neer Circle, Dr. Hasan was also selected to be co-chair of the ASES Education Committee for 2020-2021. The committee has implemented several educational initiatives including an eight-week virtual practice management education series for shoulder and elbow fellows. In addition, the committee has submitted a proposal for a shoulder and elbow self-assessment examination for ABOS maintenance of certification. Finally, Dr. Hasan will co-chair a one-day course on the treatment of proximal humerus fractures "from repair to reverse" that will immediately precede the ASES Annual Meeting scheduled to be held in October in Tampa, Florida.

Personnel: Cassie Fleckenstein, Jennifer Riccobene

Publications

1. Schumaier AP, Kovacevic D, Schmidt C, Green A, Rokito A, Jobin C, Yian E, Cuomo F, Koh J, Gilotra M, Ramirez M, Williams M, Burks R, Stanley R, Hasan S, Paxton S, Hasan S, Nottage W, Levine W, Srikumaran U, Grawe B. Defining massive rotator cuff tears: a Delphi consensus study. *Journal of Shoulder and Elbow Surgery* 2020, 29(4): 674-680. doi: 10.1016/j.jse.2019.10.024. PMID: 32197762.
2. Hsu, J.E., Yian, E.H., Budge, M.D., Duquin, T.R., Garrigues, G.E., Gilotra, M.N., Green, A., Hasan, S.S., Iannotti, J.P., Khazzam M., King, J.J., Koh, J.L. Namdari, S., Nottage, W.M., Streit, J., Virk, M., Whitson, A.J., Ricchetti, E.T. "Variability of culture specimen processing for suspected Shoulder periprosthetic joint infections during revision arthroplasty", Sem Arthr - J Shoulder Elbow Surg., 2020;30:174-180.
3. Parker, D., Smith, A., Fleckenstein, C.M., Hasan, S.S., "Arthroscopic evaluation and treatment of complications that arise following prosthetic shoulder arthroplasty", J Bone Joint Surg-Rev. 2020;8(8):e20.00020.
4. Hasan, S. S. "Editorial Commentary: Classic and Congruent Arc Latarjet are Equally Safe and Effective Procedures so Choose Whichever Technique Works Best in Your Hands for Your Patients." *Arthroscopy*. 2020;36(9):2377-2379.
5. Kovacevic, D., Suriani R.J. Jr., Grawe, B.M., Yian, E.H., Gilotra, M.N., Hasan, S.A., Srikumaran, U., Hasan, S.S., Cuomo, F., Burks, R.T., Green, A.G., Nottage, W.M., Theja, S., Kassam, H.F., Saad, M.A., Ramirez, M.A., Stanley, R.J., Williams, M.D., Nadarajah, V., Konja, A.C., Koh, J.L., Rokito, A.S., Jobin, C.M, Levine, W.N., Schmidt, C.C. "Management of irreparable massive rotator cuff tears: a systematic review and meta-analysis of patient-reported outcomes, reoperation rates and treatment response", J Shoulder Elbow Surg, 2020 Aug 4:S1058-2746(20)30624-8. Epub
6. Hasan, S.S., O'Loughlin, J.P., Sorger, J. "A large intermuscular shoulder lipoma causing pain and weakness in an 87-year-old patient: A Case Report", J Shoulder Elbow Surg International, 2020, Dec 4: S2666-6383(20)30190-0. Epub
7. Hasan, S.S. Perspective on "Metabolic and inflammatory links to rotator cuff tear in hand osteoarthritis: A cross sectional study" by Suh et al., *Orthopedics Today*, March 2020.
8. Hasan, S.S. Perspective on "30-day Readmissions and Reoperations after Total Elbow Arthroplasty: A National Database Study" by Cutler et al., *Orthopedics Today*, August 2020.
9. Hasan, S.S. Perspective on "Non-inferiority seen with subacromial spacer for rotator cuff tear vs. partial repair" by Verma et al., *Orthopedics Today*, November 2020.

Manuscripts/Textbook chapters under review, in press

1. Kohrs, B. and Hasan, S.S., "Indications", In: Reverse Shoulder Arthroplasty: A Comprehensive Case-Based Approach. J. Abboud, ed. SLACK Inc., *in press*.
2. Mahoney, J.R. and Hasan, S.S., "Total Shoulder Arthroplasty in the Young Patient", In Shoulder Arthritis in the Young Patient, G. Horneff, B. Grawe, and J. Abboud, eds. SLACK Inc. *in preparation*.
3. Khazzam, M., Mahoney J.R., and Hasan, S.S., "Treatment of Acute Shoulder PJI: Debridement and Implant Retention". In: "Current Controversies in Periprosthetic Joint Infection: Clarifying Key Concepts for Patient Care", N.S. Piuzzi, V.J. Sabesan, C.A. Higuera, eds., Helio Inc., *under review*.
4. Hasan, S.S., Schwindel L.E., Fleckenstein, C.M., "Prosthetic shoulder arthroplasty in patients 40 years old or less: early outcomes stratified by diagnosis and surgery", *in preparation*.

5. Palmer, M., Fleckenstein, C.M., Levy, M.S., Hasan, S.S., "The Distribution of Shoulder Replacements among Surgeons and Hospitals is Changing over Time", Sem Arthr - J Shoulder Elbow Surg., 2020, *in preparation*.
6. Almasri, M., Kohrs, B., Fleckenstein, C.M., Nolan, J., Wendt, A., Hasan, S.S. "Reverse shoulder arthroplasty in patients 85 years old or greater: safety and effectiveness stratified by age and diagnosis", J Shoulder Elbow Surg., *in preparation*.
7. Hasan, S.S., Ajayi A., Hajjar, M., Fleckenstein, C.M., Nolan, J., Wendt, A. "Arthroscopic repair of retracted massive rotator cuff tears with and without augmentation using a collagen scaffold patch: A preliminary study of early outcomes and tendon healing", 2020, *in preparation*.
8. Almasri, M., Kohrs, B., and Hasan, S.S. "Prosthetic shoulder arthroplasty in patients 80 years and older: A systematic review", J Bone Joint Surg. Reviews, *in preparation*.

Current Studies

1. Longitudinal Study of the Results of Shoulder Replacement Surgery in Patients 40 Years Old or Less: The purpose of this study is to prospectively track and evaluate the short- and long-term outcomes of shoulder replacement surgery in patients age 40 years and younger. Dr. Hasan is currently tracking 40 patients for this study and has reported the outcomes at conferences in Paris, France (2017), Las Vegas (2018), and Buenos Aires, Argentina (2019).
2. 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.
3. OrthoSpace Multi-Center Study on the InSpace Balloon Arthroplasty: This multi-center, randomized controlled clinical trial will evaluate the InSpace balloon arthroplasty device. Mercy Health - Cincinnati SportsMedicine and Orthopaedic Center is one of 18 sites in the United States conducting this investigational device exemption study as a requirement for FDA approval. The balloon arthroplasty is a biodegradable saline filled balloon that is inserted arthroscopically into the subacromial space in order to improve comfort and function in patients with an irreparable rotator cuff tear but who still have preserved active range of motion.
4. 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.
5. 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.
6. 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.
7. 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.
8. 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.

Dr. Hasan and colleagues enjoyed lively discussion at the recent DJO Fellows Course in Tampa, Florida.

Hip Division: Clinical Outcome Studies & Applied Clinical Research

The prospective clinical outcomes hip division is responsible for every phase of all patient-related studies under the direction of Dr. Michael Palmer, Dr. Mahmoud Almasri and adjunct faculty, Dr. Sanjeev Bhatia. The Hip Arthroscopy and Joint Preservation Center aims to provide patients from the Midwest region and beyond with a cutting edge, multidisciplinary approach involving injuries of the hip. Using the latest in newly developed arthroscopic and open surgical techniques, newly developed cartilage technologies, and non-surgical rehabilitation protocols and injections, the Center aims to provide young, active individuals with the best evidence-based non-arthroplasty treatment options for relieving hip pain, delaying the progression of end stage arthritis, and returning individuals to sports and function. Additionally, the Center is actively engaged in research and education efforts to advance the understanding of hip and joint preservation, sports medicine, and orthopaedic wellness.

Personnel: Cassie Fleckenstein, Jennifer Riccobene

Current Studies

1. In Office Ultrasound Guided Intra-articular Hip Injection vs. Hospital and Operating Room Based Fluoroscopic Guided Intra-articular Hip Injection: A Cost Minimization Analysis.
2. Can Effective Outcomes with Hip Arthroscopy be Achieved in Obese Individuals?: A Matched Cohort Analysis.
3. Osteochondroplasty Benefits the Pragmatic Patient with Femoroacetabular Impingement: Analysis from the Embedded Prospective Cohort of the FIRST Trial.
4. Urinary and Sexual Dysfunction Following FAI Surgery: Analysis from the FIRST Trial
5. Postoperative Radiographic Outcomes in Arthroscopic Osteochondroplasty for FAI: A Systematic Review and Meta-Analysis.
6. Effect of Femoral and Acetabular Version on Outcomes Following Hip Arthroscopy: A Systematic Review and Meta-analysis.

Publications

1. Almasri M, Ayeni OR. Editorial Commentary: Defining Proficiency in Hip Arthroscopic Surgery Is Facing Its Own Learning Curve. Arthroscopy. 2020 Dec;36(12):3106-3107. doi: 10.1016/j.arthro.2020.08.028. PMID: 33276895.
2. 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 Jan 2. doi: 10.1007/s00167-020-06401-x. Epub ahead of print. PMID: 33386426.
3. Briggs KK, Soares E, Bhatia S, Philippon MJ. Postoperative alpha angle not associated with patient-centered midterm outcomes following hip arthroscopy for FAI. Knee Surg Sports Traumatol Arthrosc. 2019; 27(10: 3105-3109.
4. Ellman MB, Scheidt M, Skendzel JG, Bhatia S. Successful hip arthroscopy using postless distraction in a professional basketball player: a case report. JBJS Case Connect. 2019; 9(4): e0080.
5. Ellman MB, Hulse J, Chahla J, Bhatia S. Kite measurement technique for enhanced accuracy and technical proficiency of graft preparation in segmental labral reconstruction of the hip. Arthrosc Tech. 2019; 8(9): e1043-e1049.

Multimedia

1. Almasri M, Ayeni OR. Labral Reconstruction of the Hip: Indications & Outcomes. *Video Published on the FAI Application Nov 18, 2020.*

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, Lauren Huser, MEng, Clinical Fellows

Publications

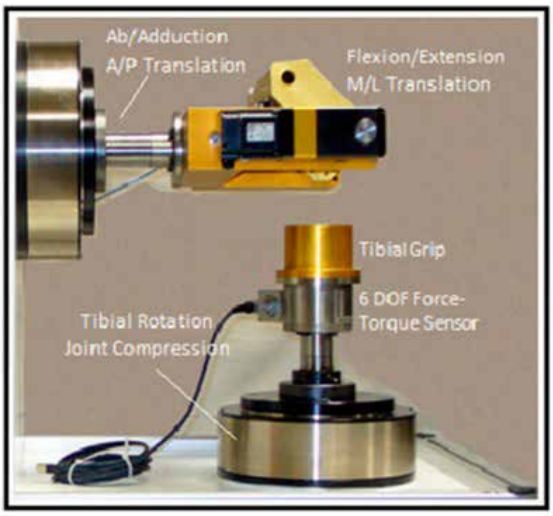
1. Noyes FR, Clark OM, Grood ES, Johnson DJ. The function of the cruciate ligaments, posterior capsule and other structures in resisting knee hyperextension: A robotic analysis of cadaveric knees. Submitted to J. Bone Joint Surgery, 2020.
2. Noyes FR, Huser LE, Palmer MP. A biomechanical study of pivot-shift 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. Arthroscopy, 2021. 37(2): 672-681.

Current Studies

1. Correlative function of a BPTB ACL reconstruction in restoring normal anterior tibial translation and normal lateral tibiofemoral compartment translations in a pivot shift test.
2. Development of the predictability of the relationship between the Lachman and pivot shift tests in the ACL-deficient knee using historical data.

Upcoming Studies

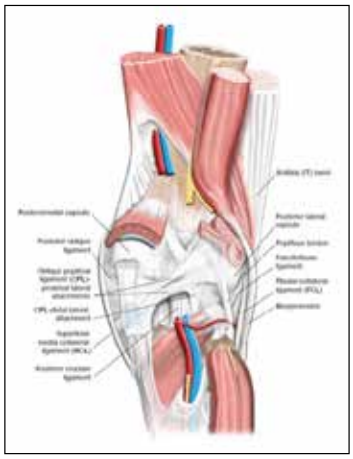
1. Biomechanics of posterior cruciate ligament (PCL) deficiency and reconstruction.
2. Three-dimensional function of the ACL characterized by 3-D maps.
3. Kinematic alterations and treatment problems with abnormal knee hyperextension in ACL and other ligament knee injuries.
4. Effect of changing tibial slope on knee hyperextension: important measurement techniques for surgical correction of abnormal tibial slope.



Biomechanics and Robotics Division

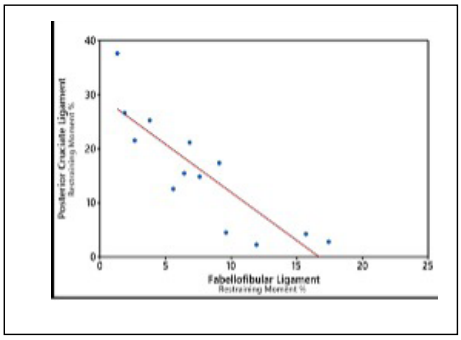
Synopsis of Work

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.



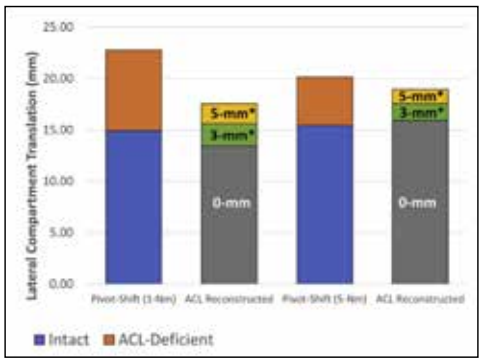
We are preparing a manuscript that uses data from 14 knee specimens tested via the robot during hyperextension. The goal of this study was to determine which of the 13 selected structures in the posterior aspect of the knee provide the greatest resistance to knee hyperextension.

Each specimen was conditioned and then promptly hyperextended to the predetermined moment of 27N·m, as based on previous studies. The average degree of hyperextension was 13.7° ± 6.7°. In position-control, each of the structures was sequentially cut, providing a decrease in moment that was recorded. Upon the collection of the data, trends between structures, structure locations, and the degree of hyperextension were analyzed and compared for patterns. It was concluded that there is no single primary structure in preventing hyperextension, but rather a collection of major and minor structures that resist hyperextension.

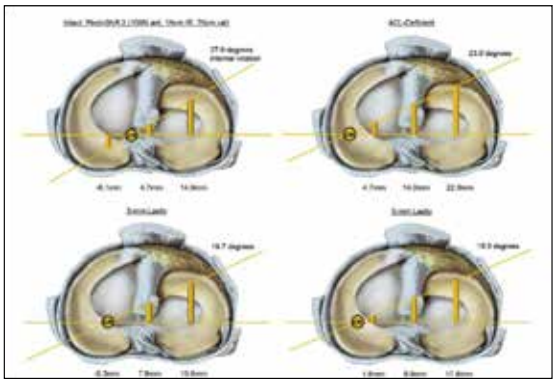


Based on this study, those structures included the anterior cruciate ligament, posterior cruciate ligament, posteromedial capsule, and oblique popliteal ligament, which combined accounted for 54.7% of the restraining moment. It was also observed that there was a strong inverse relationship between the posterior cruciate ligament and the fabellofibular ligament, as well as positive relationship between the PCL and the degrees of hyperextension (i.e., as the degrees of hyperextension increase, the role of the PCL increases). These results expand on results of previously published works and the understanding of the posterior knee.

The second study was published in Arthroscopy in February of 2021. This research was to determine the statistical and predictive correlation between instrumented Lachman and pivot-shift tests with progressive loss of anterior cruciate ligament (ACL) function. It used kinematic correlations between pivot-shift and Lachman anterior tibial translations (ATTs) in ACL-deficient and ACL-reconstructed states and in partially lax ACL grafts which were determined with precise robotic testing in cadaveric knees.



The tibia was digitized to study the resulting medial, central, and lateral tibiofemoral compartment translations. The study consisted of two groups: group 1 had 15 knees with bone-patellar tendon-bone reconstructions tested first, followed by ACL graft loosening with 3- and 5-mm increases in Lachman ATT; group 2 had 43 knees that underwent robotic testing before and after ACL sectioning and underwent analysis of the effect of 3- and 5-mm increases in Lachman ATT and complete ACL sectioning on pivot-shift compartment translations. In group 1 knees, ACL graft loosening allowing a 3-mm increase in Lachman ATT resulted in increases in pivot-shift lateral compartment translation of only one-half of those required for a positive pivot-shift test finding. In group 2, for a 3-mm increased Lachman test, there were no positive pivot-shift values. In both groups, a Lachman test with an increase in ATT of 3 mm or less (100 N) had a 100% predictive value for a negative pivot-shift test finding. With ACL graft loosening and a 5-mm increase in the Lachman ATT, group 1 still had no positive pivot-shift values, and in group 2, a positive pivot-shift test finding occurred in 3 of 43 knees (7%, pivot shift 1-Nm internal rotation). After ACL sectioning, a highly predictive correlation was found between abnormal increases in Lachman and pivot-shift translations ($P < .001$).



Therefore, it was concluded that ACL graft slackening and an instrumented Lachman test with an increase in ATT of 3 mm or less were 100% predictive of a negative pivot-shift subluxation finding and retained ACL stability. Further graft slackening and a 5-mm increase in the Lachman ATT produced pivot-shift lateral compartment ATT increases still less than the values in the ACL-deficient state; however, 7% of the knees (3 of 43) were converted to a positive pivot-shift test finding indicative of ACL graft failure. These results provide insight into instrumented Lachman tests to provide objective data on ACL function and graft failure to supplement subjective pivot-shift tests and are highly recommended for single-center and multicenter ACL studies.

Biomechanics and Robotics Division

The Foundation congratulations 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

Orthobiologics refers to the treatment of musculoskeletal disorders using different autologous and allogenic products. This treatment modality has been incorrectly advertised as "Stem Cell Therapy" however these products often do not contain any stem cells or in such a small amount to not have benefits. Further there is no scientific evidence of any regenerative or direct reparative effect of any of these products despite the majority of advertising on the internet and clinics stating the opposite. Recently Kingery et al (JBJS 2020) reported that 95.9% of practice websites contained at least one statement of misinformation and "failed to accurately represent the clinical efficacy" of "Stem Cell Therapy". It is in fact unethical and illegal to advertise or promote such deceptive claims and accordingly physicians and hospital systems are currently experiencing great difficulty in responding to patients requests for these types of treatment modalities that are not based on accurate scientific evidence.

The Orthobiologics division was established in 2019 as part of a service line initiative of Cincinnati Sports Medicine and Orthopedic Center – Mercy Health and the Noyes Knee Institute to address the issues of treatment in using Orthobiologics. Under the leadership of knowledgeable and experienced physicians Drs. Frank Noyes, Edward Marcheschi, Sambhu Choudhury and Brian Chilelli, this division is responsible for every phase of our clinical outcome studies and in particular that these treatment modalities, when offered, are based on scientific evidence and patient understanding as to their benefits and equally understanding the false claims as patients often seek out these therapies expecting a reparative or curative treatment. As previously stated there is a tremendous amount of information available on the internet, but there is a lack of well designed, prospective clinical outcome studies for knee osteoarthritis. An extensive analysis and systematic review was completed by this Division for treating knee osteoarthritis which formed the basis for the clinical outcome studies initiated. This review reaffirmed the pressing need for accurate clinical information in the treatment algorithm for using these products to treat knee osteoarthritis.

The first mission of the Orthobiologics Division is the education of patients and medical professionals on the scientific basis and clinical efficacy of recommending orthobiologic products to treat knee osteoarthritis based on the most current and scientific publications available world-wide. The second mission is to conduct well designed studies on the clinical outcomes and efficacy of selected orthobiologic products. A final mission is to provide scientifically accurate recommendations to Hospital Systems and patient treatment centers on the incorporation of orthobiologics into their treatment approaches for knee osteoarthritis.

Personnel: Cassie Fleckenstein, Jennifer Riccobene

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 will be completed in 2021
   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.

Biologics Division: Clinical Outcomes Studies and Applied Clinical Research

2. Prospective, Randomized Control Trial: Principal Investigators: Dr. Frank Noyes, Dr. Edward Marcheschi
   a. Prospective RCT of a commercial platelet rich plasma (PRP) intraarticular knee injection based on a treated and control group of 100 patients.
   b. Active patients, age 40-65 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 make recommendations to Bon Secours – Mercy Health regarding the efficacy of specific PRP products in the Orthopaedic service line as well as publication of the results in peer reviewed journals.
3. Prospective, Randomized Control Trial: Principal Investigators Dr. Brian Chilelli, Dr. Frank Noyes
   a. This trial will initiate in 2021 and involves a clinical outcome study in using microfragmented adipose tissue for the intra-articular knee injection for osteoarthritis. An RCT is currently in progress and decisions will be made as to conducting the study in this Division or joining a multicenter clinical trial.

It is now known that PRP and BMAC injections do have a role in decreasing symptoms of knee arthritis. However, no study has ever shown that these injections will regenerate articular cartilage. Recent publications have shown that direct to consumer marketing of "stem cells" contains unethical information and claims of cartilage regeneration, which does not occur.

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, Thomas Campbell, Sue Barber-Westin, 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.

Number of Athletes Trained

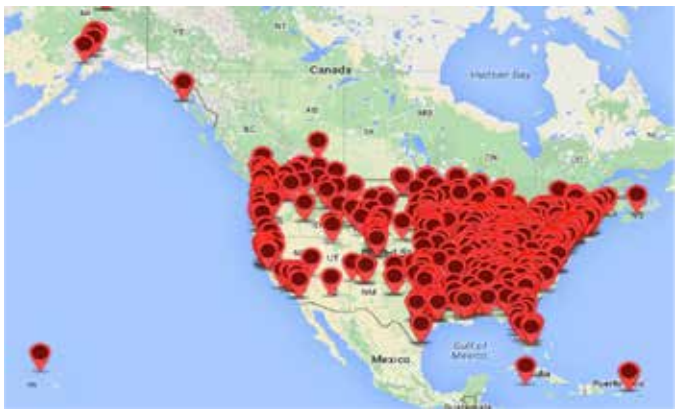
- Over 4,300 athletes trained in the Cincinnati area since 2001 with overall significant improvements in neuromuscular indices, strength and conditioning levels.
- 50 athletes in 2020

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 2,300 individuals from 1,400 sites. We have certified trainers in all 50 states and 14 countries.

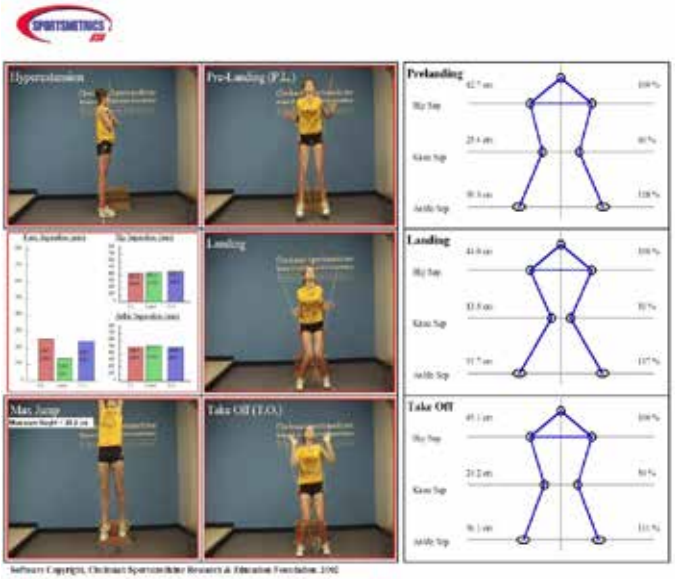
In 2020, 79 individuals were certified to offer the Sportsmetrics™ program in their communities. 2020 presented new challenges with the global pandemic. We were able to complete four in-person courses before moving to a virtual learning platform due to nationwide shutdowns and travel restrictions.

Certifications were held in Cincinnati, OH and Grand Rapids, MI before the lockdown began. An additional three courses were completed virtually while still continuing to keep a hands-on training environment for all who attended.



International Sites

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



On-Site Host Sites since 2002 and number certified

1. Premier Bone & Joint Centers (16): Laramie, WY
2. SERC Physical Therapy (44): Kansas City, MO
3. Dayton Children's Hospital (18): Dayton, OH
4. University of Louisiana - Lafayette (10): Lafayette, LA
5. Emeryville Sports Physical Therapy (10): Emeryville, CA
6. Therapeutic Associates (46): Portland, OR
7. Carolinas Rehabilitation (34): Charlotte, NC
8. Community Rehab (17): Fremont, NE
9. McLeod Sports Medicine (25): Florence, SC
10. Ivy Rehab (23): Hoboken, NJ
11. Victory Sports Medicine (20): Skaneateles, NY
12. North Dakota State University (12): Fargo, ND
13. Apex Physical Therapy (10): San Mateo, CA
14. Georgia Sports Medicine (21): Atlanta, GA
15. The Jackson Clinics (30): Reston, VA
16. Hurley SportsCare (13): Flint, MI
17. SportsCare Memorial Medical Center (32): Springfield, IL
18. Physiotherapy Associates (18): Denver, CO
19. Physiotherapy Associates (15): Dover, DE
20. Northern Michigan Sports Medicine Center (16): Indian River, MI
21. Kitsap Physical Therapy & Sports Clinics (14): Silverdale, WA
22. St. Alphonsus Sports Medicine (20): Boise, ID
23. 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™ 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
  - Functional hop tests
  - Video analysis of a single leg squat
  - Vertical jump assessment
  - Core strength assessment
  - Speed, agility & endurance tests
  - Biodex isokinetic strength assessment (when available)

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™ 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.

Local, National, and International Meeting Presentations

Frank R. Noyes, MD

1. My Experience: Pushing the Envelope in Complex Meniscus Tears: What Makes Sense to Me – 30-Years Experience, Orthopaedic Summit Evolving Techniques – Digital Meeting, December 10-12, 2020
2. Clinical Case Presentations with Questions & Answers: Meniscus Rapid Fire: Tell Us What You Would Really Do! Don't Hide, Orthopaedic Summit Evolving Techniques – Digital Meeting, December 10-12, 2020
3. Clinical Case Presentations with Questions & Answers: Graft Choice, Return to Play & Complications, Orthopaedic Summit Evolving Techniques – Digital Meeting, December 10-12, 2020
4. The Aging Athlete: Dealing with "Tweeners" – Section Moderator, Orthopaedic Summit Evolving Techniques – Digital Meeting, December 10-12, 2020
5. Wrap-up-Questions & Answers – Moderator, Orthopaedic Summit Evolving Techniques – Digital Meeting, December 10-12, 2020

Samer S. Hasan, MD, PhD

1. What Has and Has Not Worked in Shoulder Surgery, Ohio Shoulder and Elbow Surgeons, Columbus, Ohio, January 11, 2020.
2. Match Point System, DJO Sales Rep Education Hour (virtual), April 15, 2020.
3. Moderator, Fellows Webinar: Ask the Expert Panel: What I've Learned and Changed since Fellowship, May 19, 2020.
4. Grade III AC Joint in Young Active Female with Hyperlaxity, ASES Virtual Conference for Fellows, July 9, 2020.
5. Anatomic Total Shoulder Arthroplasty: From the Youngest to the Oldest, Current Concepts in Total Shoulder Arthroplasty Webinar, July 23, 2020
6. Reverse shoulder arthroplasty: challenging primary cases, Current Concepts in Total Shoulder Arthroplasty Webinar, July 23, 2020
7. The next 10 years in shoulder arthroplasty, Current Concepts in Total Shoulder Arthroplasty Webinar, July 23, 2020
8. Case Presentations Panelist, Current Concepts in Total Shoulder Arthroplasty Webinar, July 23, 2020
9. Panelist, Shoulder Arthroplasty in the Young Active Patient, Dubai Shoulder Course - Webinar, July 28, 2020.
10. Reverse Shoulder Replacement, Shoulder Conference, University of Cincinnati, Department of Orthopaedic Surgery, November 13, 2020.
11. Proximal Long Head Biceps Pathology, Curso de Updates en Patologia de Hombro (Granada, Spain), Webinar , December 3, 2020.

Mahmoud Almasri, MD

1. Managing the B2, B3 Glenoid: High Side Reaming, Augmented Glenoid, or Reverse Total Shoulder Arthroplasty? DJO Advance Orthopaedic Education – Fellows Switchover Course, Cincinnati, OH, July 2020
2. Canadian Arthroscopy Meeting (CAM) – Conmed Linvatec, Virtual Conference. Clearwater, FL, November 2020.
3. Arthroscopic Soft Tissue Repairs for Shoulder Instability. Curso De Updates En Patologia De Hombro, Updates in Shoulder Pathology - Virtual Shoulder Conference, Granada, Spain, December 2020.

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.

The 2019 meeting was our 34th Annual Advances on the Knee, Shoulder, Hip and Sports Medicine Conference. We welcomed over 200 orthopaedic surgeons, physician assistants, physical therapists, physical therapy assistants, and athletic trainers to this conference. In addition to over 200 course participants, we welcomed 12 exhibitors. Course participants enjoyed listening to over 32 hours of presentations, breakouts, and panel discussions on the treatment of disorders of the knee, shoulder, elbow, hip, and sports medicine.




We are purposely showing the events of the 2019 Hilton Head meeting to showcase this national event that has occurred every year for nearly four decades! Due to the pandemic caused by COVID-19, this major educational event had to be cancelled in 2020. We appreciate our stellar faculty and have included those who were scheduled to present. In an effort to keep everyone safe, we have decided to hold the conference virtually in 2021. This virtual meeting will be a presentation on the advances in knee, shoulder, elbow, hip, and Sportsmetrics™ and will included advanced rehabilitation practical sessions.

We invite all to join us May 28th – 31st for the 2022 Advances on the Knee, Shoulder, Hip, and Sports Medicine conference when we return to our live, in-person national event.






2020 Course Faculty:

Frank R. Noyes, MD

Matthew L. Busam, MD

Geoffrey Doner, MD

Jeffrey R. Dugas, MD

Samer S. Hasan, MD, PhD

Thomas N. Lindenfeld, MD

Walt Lowe, MD

G. Peter Maiers, II, MD

Michael P. Palmer, MD

Shital Parikh, MD

Anthony A. Romeo, MD

Edward M. Wojtys, MD

Timothy P. Heckmann, PT

George J. Davies, DPT

Julie Jasontek, PT

Russell M. Paine, PT

Kevin E. Wilk, DPT

Mahmoud Almasri, MD

Andrew C. Crapser, MD

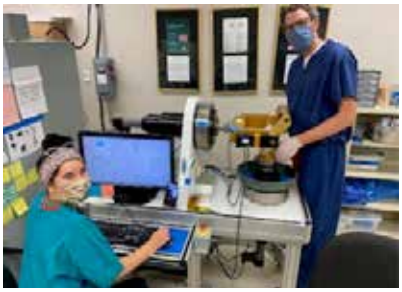
Nathan M. Krebs, DO

J. Trevor Stefanski, MD

Marion M. Swall, MD

Stephanie L. Smith, MS

Sports Medicine Fellowship Program



The fellowship program at Cincinnati SportsMedicine and Orthopaedic Center – Mercy Health is nationally acclaimed as one of the finest post-residency, sports medicine specialty training experiences. 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 and the fellows every year express their gratitude for the surgical and clinical experience. 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, Thomas N. Lindenfeld, MD, Marc T. Galloway, MD, Samer S. Hasan, MD, PhD, Matthew L. Busam, MD, Michael P. Palmer, MD, Brian Chilelli, MD, Mahmoud Almasri, MD, Cassie Fleckenstein, Teresa Wood

Studies Completed

1. Results of Prosthetic Shoulder Arthroplasty in Patients Under Age 40
2. Distribution of Shoulder Replacement Among Surgeons and Hospitals
3. Shoulder Arthroscopy Following Shoulder Replacement Surgery: Systematic Review
4. 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
5. Instructional Video – Anterior Closing Wedge Osteotomy to Correct Abnormal Tibial Slope Prior to ACL Reconstruction
6. Reverse Shoulder Arthroplasty in Patients 90 Years Old or Greater

Publications

1. Parker DB, Smith AC, Fleckenstein CM, Hasan SS. Arthroscopic evaluation and treatment of complications that arise following prosthetic shoulder arthroplasty. JBJS Rev. 2020; 8(8):e2000020-8
2. Almasri M, Noyes FR. Anterior Closing Wedge Osteotomy of the Proximal Tibia – Video Review & Technical Instruction. Published on VuMedi, Aug 31 2020

Manuscripts Under Review/In Press

1. Palmer M, Fleckenstein C, Hasan S. The Distribution of Shoulder Replacements is Changing
2. Taylor ML, Palmer MP, Noyes FR. The Missed Lateral Meniscus Tear: Arthroscopic Repair of Tears at the Popliteal Hiatus
3. Krebs NM, Barber-Westin S, Noyes FR. Generalized joint laxity is associated with increased failure rates of primary anterior cruciate ligament reconstructions: A systematic review. In press, Arthroscopy, 2021

Current Studies

1. Blood Flow Restriction Training for Severe Muscle Atrophy Following Knee Injury and Surgery
2. Clinical and MRI Outcomes of Patients Undergoing Repair of Large and Massive Rotator Cuff Tears with Collagen Patch Augmentation: A Retrospective Cohort Study
3. Handedness in Orthopaedic Surgery
4. Knee Hyperextension Measurements
5. Women's Sports Medicine Initiative
6. Quadriceps Strength After ACLR with Quadriceps Tendon Autograft: Systematic Review

The fellowship program continues to be enriched with Dr. Marc Galloway as the Cincinnati Bengals team physician and with Dr. Matthew Busam as the Chief Medical Officer for FC Cincinnati. Accompanied by the athletic coverage at local high schools, our fellowship provides for a robust sports medicine experience.

University of Cincinnati Department of Biomedical Engineering

Collaboration with the University of Cincinnati Department of Biomedical Engineering continued into its 43rd 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).

Under the direction of Jason Shearn, PhD, the Department of Biomedical Engineering continues to advance the field of biomedical engineering. In August 2020, the Department welcomed Thomas Talavage, PhD as the new Chair. Since the formation of the BME Department, it has grown to include 11 primary faculty members, 4 joint faculty members, and 35 secondary faculty members. In addition, there are 437 undergraduate students and 53 graduate students in the various programs offered by the Department of Biomedical Engineering.

Given the long-standing relationships with our Foundation and the University of Cincinnati Department of Biomedical Engineering, we are in the process of developing for 2021 a renewed collaboration with recently appointed 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.

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

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]

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

2019 Event Photos

American Academy of Orthopaedic Surgeons Annual Meeting

2019 Event Photos

34th Annual Advances on the Knee, Shoulder, Hip and Sports Medicine Conference









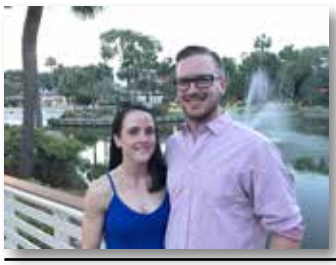


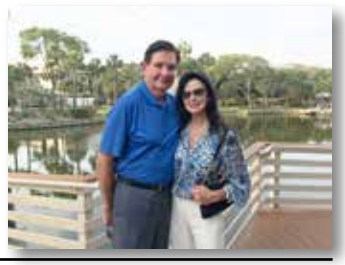








Cincinnati SportsMedicine Research
& Education Foundation

Noyes Knee Institute

The Jewish Hospital —
Mercy Health

Mercy Health — Fairfield Hospital

Mercy Health — West Hospital

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Office:

10663 Montgomery Road, Cincinnati, OH 45242

Web: www.cincinnatisportsmed.com
www.noyeskneeinstitute.com
noyeskneebookseries.com