



THE UNIVERSITY OF
CHICAGO

DEPARTMENT OF

Orthopaedic Surgery + Rehabilitation Medicine

2014-2015 ANNUAL REPORT



The University of Chicago Medicine Center For Care and Discovery is truly a “hospital for the future.” At 1.2 million square feet, the hospital occupies two city blocks. It provides a home for complex specialty care and a highly advanced center to train the physicians and surgeons of tomorrow. In this year’s annual report, we’ll share some photos and factoids about this incredible facility.

OVERVIEW

At the time I write this letter, almost three years have passed since the creation of the Department of Orthopaedic Surgery and Rehabilitation Medicine at the University of Chicago Medicine. I could not be prouder of the accomplishments we have made in this short time—they have far exceeded my expectations and I am so proud of and grateful to every individual in our department, as each of their contributions have been instrumental to our success.



Our paramount focus has remained patient service and access. We are building an atmosphere where nearly every patient request for access is answered with “yes,” and that atmosphere is already driving significant improvements. Through a great deal of hard work, outpatient visits grew 70 percent in the past two fiscal years. Patient satisfaction scores are also climbing and, thanks to our new practice manager, Marianne Freer, outpatient clinics are functioning better than ever before. Surgical cases have soared to new heights, and patient satisfaction with their surgical experience has also soared.

Our faculty have continued to get busier, led by the outstanding growth in Dr. Lewis Shi’s practice and by extremely strong growth in our spine group—Drs. James Mok and Michael Lee. In the past year, we have hired three outstanding faculty who will fill key roles in our department. We were able to recruit Aravind Athiviraham, MD, a sports orthopaedic surgeon, from Baylor University, where he had a promising career; his skill as a surgeon and educator has quickly made a positive contribution. Megan Meislin Conti Mica, MD, has just completed a

hand fellowship at the Mayo Clinic and is now obtaining additional experience in shoulder surgery in Belgium; she will be a key contributor to our hand and upper extremity program. Finally, we were very excited to recruit Jennifer Wolf, MD, from the University of Connecticut, where she has had an exemplary career as a hand surgeon and researcher. Dr. Wolf will start work with us in 2016 and will help lead our hand program to a very bright future.

We have seen excellent progress in many of our scholarly endeavors this year as well. Our commitment to assembling and our ability to analyze large datasets to better answer clinical questions and help assess value in musculoskeletal care has begun to pay solid dividends. Manuscripts using big data to assess areas such as shoulder surgery, spine care, fragility fractures and arthritis care are but a few examples of areas in which our endeavors have led to publication in key journals. Orthopaedic trainees and Pritzker medical students have been invaluable contributors to these efforts, further cementing this line of investigation into our educational programs. Even more exciting are recent plans to leverage our expertise in computerized image analysis of radiographs and institutional expertise

in genomics and image processing to begin investigations that link genomic data, radiographic information and clinical outcomes in exciting ways that may predict disease progression and lead to customized musculoskeletal care.

I am excited about the outstanding progress we have already made, as well as the opportunities ahead to advance orthopaedics at the University of Chicago Medicine and on a national level. We will, in the next two years, be expanding our clinical locations to the southwest suburbs and to the South Loop, and we will be participating in a large way in the planning, opening and operations of a new level 1 adult trauma center. This center at Holy Cross Hospital will add greatly to our educational programs and will add immeasurably to the services we provide South Side Chicago communities. There is no doubt our future is highly exciting!

Douglas R. Dirschl, MD

*Lowell T. Coggeshall Professor
of Orthopaedic Surgery*

*Chairman, Department of
Orthopaedic Surgery and
Rehabilitation Medicine*

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UNIVERSITY OF CHICAGO FACULTY

Professors of Orthopaedic Surgery

Douglas R. Dirschl, MD
Henry Finn, MD
John Martell, MD
Daniel P. Mass, MD
Anthony Montag, MD*
Michael Simon, MD
Brian Toolan, MD

Professor Emeritus of
Orthopaedic Surgery

Bruce Reider, MD

Associate Professors of
Orthopaedic Surgery

Robert Bielski, MD
Rex Haydon, MD, PhD
Tong-Chuan He, MD, PhD
Sherwin Ho, MD
Michael Lee, MD
Hue Luu, MD
Christopher Sullivan, MD

Assistant Professors of
Orthopaedic Surgery

Aravind Athiviraham, MD
Jovito Angeles, MD
Holly Benjamin, MD*
Roderick Birnie, MD
Megan Meislin Conti Mica, MD
Ryan Hudson, MD
Richard Kang, MD
James Mok, MD
Lewis Shi, MD
Ann Zmuda, DPM*

Clinical Associate Professor of
Orthopaedic Surgery

Michelle Gittler, MD

Clinical Assistant Professors
of Surgery

Mary Lawler, MD
Lisa Thornton, MD

Clinical Associates

Cheryl Benjamin, DO
Raymond Lee, MD
Edward Park, MD
Karl Sandin, MD

Visiting Assistant Professors

Jiaming Fan, MD
Yulong Zou, MD

Visiting Research Associates
(Assistant Professor)

Youlin Deng, MD, MSc
Jing Wang, MD, MSc
Qiang Wei, MD, MSc

Visiting Scholars

Dan Guo, MD, PhD
Jiayi Huang, MD, PhD
Junyi Liao, MD
Fent Liu, MD, PhD
Jianxiang Liu, MD, PhD
Hao Liu, MD, PhD
Minpeng Lu, MD, PhD
Chao MA, MD, PhD
Dongzhe Song, DDS
Shengli Tang, MD, PhD
Zhongliang Wang, MD, PhD
Xin Wang, MD
Zhengjian Yan, MD
Fugui Zhang, MD
Zhonglin Zhang, MD, PhD
Lianggong Zhao, MD

PhD/MD Student

Mary Rose Rogers

NORTHSHORE AFFILIATED FACULTY

Clinical Professor

Leon Benson, MD

Clinical Associate Professors

Jason Koh, MD
James Kudrna, MD
William Robb III, MD
Anand Srinivasan, MD
Howard Sweeney, MD

Clinical Assistant Professors

Joseph Alleva, MD
Ravi Bashyal, MD
David Beigler, MD
Eric Chehab, MD
Bradley Dunlap, MD
Miledones Eliades, MD
Thomas Hudgins, MD
Eldin Karaikovic, MD
Steven Levin, MD
Seth Levitz, MD
Robert McMillan, MD
Craig S. Phillips, MD
Gary Shapiro, MD

Pritzker School of Medicine
Clinician Educators

Patrick Birmingham, MD
Catherine Choi, MD
Joseph Feldman, MD
James Fox, MD
Rachel Kermen, MD
Mark Mikhael, MD
Mark Neault, MD
Gregory Palutsis, MD
Gregory Portland, MD
Amy Ptaszek, MD
Lalit Puri, MD
Howard Robinson, MD
Danielle Schiff, MD
Naila Shaikh, MD
Rachel Sherman, MD
Van Stamos, MD

Senior Clinician Educators

Joseph Feldman, MD
James Fox, MD
Michael O'Rourke, MD
Gregory Palutsis, MD
Gregory Portland, MD
Amy Ptaszek, MD
David Shapiro, MD
Van Stamos, MD
Craig Williams, MD

*Secondary appointment



When you walk into the CCD, you'll notice the size. Each floor is over 100,000 square feet (about the size of a typical Walmart store). The main public space is the Sky Lobby on the seventh level, featuring floor-to-ceiling glass walls that provide a panoramic view of the campus and downtown Chicago. The ground level is also open to the public and includes several dining options.

Bone Health + Fragility Fractures Team

Svetlana Bielecki, ANP

Lauren Creighton, ANP

Kimberly Devine, DNP

Douglas R. Dirschl, MD

Rex C. Haydon, MD, PhD

Bone Health + Fragility Fractures

Osteoporosis, the weakening of the bones due to loss of bone mass and tissue damage, puts older patients at risk for breaking a bone. Fragility fractures—broken bones related to osteoporosis—affect more than 2 million individuals over age 50 in the United States each year. Yet, less than 20 percent of these patients receive appropriate evaluation and treatment for their underlying disease. The orthopaedic surgeons at the University of Chicago Medicine are working to raise awareness about the increasing prevalence of osteoporosis and the consequences of bone loss.

“Fragility fractures are three times more common than heart attacks,” explained orthopaedic surgeon and bone health expert, Douglas R. Dirschl, MD. “This is a huge and under-recognized public health issue.” As president of the American Orthopaedic Association (AOA), Dirschl was instrumental in developing the organization’s Own the Bone™ campaign, a national program designed to bring attention to the increasing prevalence of osteoporosis and the consequences of bone loss.

Douglas R. Dirschl, MD

Dr. Douglas Dirschl is a highly accomplished surgeon and an expert in orthopaedics. He specializes in caring for patients with musculoskeletal trauma and fractures, as well as other injuries and diseases of the bones, joints and muscles. Dr. Dirschl’s research focuses on the assessment of factors that influence reliability in classifying fractures. He has studied the quality of radiographs, as well as the use of decision-making strategies to enhance reliability (the extent to which various physicians classify a fracture in the same way).

Rex C. Haydon, MD, PhD

Dr. Rex Haydon is author of more than 25 articles and book chapters. He has accepted career development awards from both the Orthopaedic Research and Education Foundation and the National Institutes of Health. Additionally, Dr. Haydon’s research has also been supported by the Musculoskeletal Tumor Foundation.

Foot + Ankle

Foot + Ankle Team

Roderick Birnie, MD
Douglas R. Dirschl, MD
Sherwin S.W. Ho, MD (Ankle)
Brian C. Toolan, MD

At the University of Chicago Medicine, our foot and ankle team takes an individualized approach to treating foot and ankle problems, from the straightforward to the highly complex. We educate patients about their conditions and explain all available treatment options for reducing pain and improving function.

When it comes to choosing treatment, we encourage our patients to participate in the decision-making process.

Roderick Birnie, MD

Dr. Roderick Birnie specializes in non-operative general orthopaedics. He sees patients with a variety of orthopaedic issues, including both upper and lower extremity conditions.

Douglas R. Dirschl, MD

A leader in medical education and health policy, Dr. Douglas Dirschl teaches medical students, residents and physicians about orthopaedic trauma, musculoskeletal pathophysiology and fractures. He has authored three books, more than 30 book chapters, and more than 75 peer-reviewed scholarly articles.

Sherwin S.W. Ho, MD

Dr. Sherwin Ho is an expert in sports medicine, specializing in minimally invasive arthroscopic procedures of the shoulder, elbow, hip, knee and ankle. He has served as faculty at numerous advanced courses for the American Academy of Orthopaedic Surgeons.

Brian C. Toolan, MD

Dr. Brian Toolan is an orthopaedic surgeon who is an expert in the care of foot and ankle disorders for adults and adolescents. He specializes in post-traumatic, arthritic and inflammatory conditions. Dr. Toolan also treats fractures, tendon and ligament injuries, and sports-related conditions. He provides care for patients with simple and complex problems. Dr. Toolan performed the first agility total ankle replacement in Chicago.

Hand + Wrist

Hand + Wrist Team

Jovito Angeles, MD (adult and pediatric)
Roderick Birnie, MD
Megan Meislin Conti Mica, MD
Daniel P. Mass, MD (adult and pediatric)

From sporting activities to intricate work, healthy hands and wrists are critical to daily life.

At the University of Chicago Medicine, we have orthopaedic experts who are recognized leaders in the treatment of hand and wrist injuries and conditions. Our goal is to relieve pain and discomfort and to restore strength, motion, dexterity, form and function. We have the skill and expertise to treat the full range of conditions affecting the bone, joints and nerves of the hands and wrists.

Jovito Angeles, MD

Dr. Jovito Angeles is an expert in the surgical treatment of adults and children with orthopaedic conditions, particularly those with musculoskeletal problems of the upper extremities. He is also interested in the treatment of patients with traumatic and birth-related brachial plexus palsies, traumatic nerve injuries and compressive neuropathies.

Roderick Birnie, MD

Dr. Roderick Birnie specializes in non-operative general orthopaedics. He sees patients with a variety of orthopaedic issues, including both upper and lower extremity conditions. A respected educator, Dr. Birnie teaches medical students and residents in orthopaedic surgery at the University of Chicago.

Megan Meislin Conti Mica, MD

Dr. Megan Meislin Conti Mica specializes in the treatment of adults and children, including athletes at all levels, with injuries or disorders of the hand, wrist, elbow and shoulder. She has expertise in the management of traumatic and post-traumatic reconstructions, as well as the

treatment of congenital, paralytic, arthritic, infectious, tumorous and acquired conditions affecting the upper extremity and brachial plexus. Additionally, she has advanced training in minimally invasive (arthroscopic) and microvascular (microscopic) techniques.

Daniel P. Mass, MD

Dr. Daniel Mass is a highly regarded expert in orthopaedic surgery of the hand and upper extremities. He has a special interest in the research and treatment of flexor tendon injuries (injuries to the muscles that allow the fingers to bend and flex), and he also studies the mechanics of the hand, wrist and elbow. A popular speaker, Dr. Mass has given numerous presentations on hand surgery to medical audiences around the world. In addition, he has written book chapters on flexor tendon injuries, and hand and wrist surgery.

Hip + Knee Care +Preservation

Hip + Knee Care + Preservation Team

Sherwin S.W. Ho, MD

Richard W. Kang, MD, MS

Hue Luu, MD (Hip and Knee Replacement)

The orthopaedic specialists at the University of Chicago Medicine offer comprehensive care—non-operative, arthroscopic and joint replacement—for patients with hip and knee pain, instability or disability.

For younger people with hip pain, eventual replacement of the joint is no longer a given. In recent years, significant advances in hip arthroscopy for soft tissue tears, dysplasia and abnormalities have increased treatment options for patients with non-arthritic hip pain. The goal of this treatment is to relieve pain and to preserve the natural joints in order to delay or avoid total hip replacement.

Sherwin S.W. Ho, MD

Dr. Sherwin Ho is an expert in sports medicine, specializing in minimally invasive arthroscopic procedures of the shoulder, elbow, hip, knee and ankle. He has served as faculty at numerous advanced arthroscopic shoulder and knee courses for the American Academy of Orthopaedic Surgeons.

Richard W. Kang, MD, MS

Dr. Richard Kang is an orthopaedic sports medicine surgeon skilled in a variety of minimally invasive and arthroscopic procedures. He specializes in the diagnosis and management of adolescent and adult hip conditions, including labral tears and femoroacetabular impingement. Dr. Kang's objective is to delay or prevent the onset of arthritis and the need for a joint replacement. His work is dedicated towards alleviating pain and restoring the quality of life for patients.

Hue Luu, MD

Dr. Hue Luu specializes in joint replacement surgery, including knee replacement and both direct anterior and posterior-lateral hip approaches for hip replacements. His research interests include: the fundamental mechanisms regulating bone biology and bone regeneration, osteolysis in total joint replacement patients and advances in gene therapy to study applications of bone biology in fracture care. He is a leading surgeon and trainer in the use of robotic-assisted hip replacement technology.

Bone +Soft Tissue Tumors

Bone + Soft Tissue Team

Rex C. Haydon, MD, PhD

Hue H. Luu, MD

Bone and soft tissue cancer can be frightening for the children and adults that it strikes. However, the latest treatments available at the University of Chicago Medicine—from innovative chemotherapy to limb-sparing surgery—can reduce pain; fight the disease and preserve the ability to walk, work or play. Our orthopaedic oncology program includes respected experts in orthopaedic surgery, adult and pediatric oncology, diagnostic and therapeutic radiology, radiation oncology and pathology. Together, this multidisciplinary team designs the best treatment for patients with bone cancers and soft tissue sarcomas (e.g. synovial sarcomas, liposarcomas, fibrosarcomas). Multi-disciplinary meetings are held every week.

Rex C. Haydon, MD, PhD

Dr. Rex Haydon focuses on the comprehensive treatment of malignant and benign tumors in bone or soft tissue. He specializes in the surgical care of bone and soft tissue tumors, including limb-salvage and reconstructive surgery of the upper and lower extremities. Dr. Haydon works with an integrated team of specialists to ensure that patients have access to the most innovative and effective treatment options available.

Also a skilled physician scientist, his research focuses on advancing the treatment of musculoskeletal tumors. Dr. Haydon has a particular interest in the underlying causes of musculoskeletal neoplasms. Author of more than 25 articles and book chapters, he has accepted career development awards from both the Orthopaedic Research and Education Foundation and the National Institutes of Health. Additionally, Dr. Haydon's research has been supported by the Musculoskeletal Tumor Foundation.

Hue H. Luu, MD

Dr. Hue Luu is skilled in the surgical care of bone and soft tissue tumors. He also specializes in joint replacement surgery, including both direct anterior and posterior-lateral hip approaches for hip replacements. Dr. Luu works with a multidisciplinary physician team to provide comprehensive care for patients with benign and malignant musculoskeletal tumors. His research interests include the fundamental mechanisms regulating bone biology and bone regeneration, osteolysis in total joint replacement patients and advances in gene therapy to study applications of bone biology in fracture care. Dr. Luu also has an interest in studying genes that control cancer metastasis, for the purpose of identifying new diagnostic and therapeutic approaches for treating malignant cancers.

Shoulder + Elbow

Shoulder + Elbow Team

Jovito Angeles, MD
Aravind Athiviraham, MD
Megan Meislin Conti Mica, MD
Sherwin S.W. Ho, MD
Richard Kang, MD, MS
Daniel P. Mass, MD
Lewis Shi, MD

The shoulder and elbow specialists at University of Chicago Medicine offer the complete range of non-surgical, minimally invasive (arthroscopic) and open surgery for teens, young adults and older adults. We design individual treatment plans tailored to each patient's needs and goals, and we maximize use of non-surgical options prior to considering surgery.

When surgery is necessary, our orthopaedic surgeons offer innovative and advanced operative therapies for repair of shoulder and elbow conditions, both minimally invasive and open. We strive to help patients regain full function and to return to their daily activities as soon as possible.

Jovito Angeles, MD

Dr. Jovito Angeles is an expert in the surgical treatment of adults and children with orthopaedic conditions, particularly those with musculoskeletal problems of the upper extremities.

Aravind Athiviraham, MD

Dr. Aravind Athiviraham, a specialist in sports medicine, is skilled in minimally invasive and arthroscopic procedures of the shoulder and elbow. In addition, he has received advanced training in reconstructive procedures of the shoulder.

Megan Meislin Conti Mica, MD

Dr. Megan Meislin Conti Mica is a skilled hand and upper extremity surgeon. She has advanced training in minimally invasive and microvascular techniques.

Sherwin S.W. Ho, MD

Dr. Sherwin Ho is an expert in sports medicine, specializing in minimally invasive arthroscopic procedures of the shoulder and elbow. He has served as faculty at numerous advanced arthroscopic shoulder and knee courses for the American Academy of Orthopaedic Surgeons.

Richard Kang, MD, MS

Dr. Richard Kang is an orthopaedic sports medicine surgeon skilled in a variety of minimally invasive and arthroscopic procedures. He has expertise in the treatment of cartilage lesions of the shoulder.

Daniel P. Mass, MD

Dr. Daniel Mass is a highly regarded expert in orthopaedic surgery of the hand and upper extremities. He has a special interest in the research and treatment of flexor tendon injuries (injuries to the muscles that allow the fingers to bend and flex), and he also studies the mechanics of the hand, wrist and elbow.

Lewis Shi, MD

Dr. Lewis Shi is an orthopaedic surgeon who specializes in shoulder and elbow injuries. He maximizes patients' non-operative management prior to considering surgery. If necessary, he offers minimally invasive (arthroscopic) and open procedures that are appropriate for the patient's disorder. Dr. Shi's research focuses on the molecular basis of rotator cuff tear and biomechanics of shoulder arthritis. He also is part of several national and international multi-center studies to improve diagnostic and treatment protocols of shoulder injuries.

Spine

Spine Team

Michael Lee, MD
James Mok, MD

The University of Chicago Medicine orthopaedic spine team offers a wide range of non-surgical, minimally invasive and traditional proven surgical techniques for the treatment of back and neck problems. We maximize the use of non-surgical interventions for reducing pain and restoring function. When surgery is chosen, in some instances it can be performed using minimally invasive techniques that involve smaller incisions than those in traditional open surgery. We are leaders in the Chicago area in minimally invasive spinal surgery.

In all cases, patients can expect the most effective solution: a treatment that has the highest probability of providing the most improvement and durability for the longest period of time.

Michael Lee, MD

An expert spine surgeon, Dr. Michael Lee treats spinal injuries, degenerative conditions and spinal deformity as well as complex tumors of the spinal cord. He is dedicated to improving safety and quality measures for spine surgery.

Dr. Lee has worked to identify risk factors for post-operative lumbar spondylolisthesis and to enhance lumbar spine surgical techniques. He recently has focused efforts on creating models to predict the likelihood of complication after spine surgery. In addition to his research, Dr. Lee teaches medical students, residents and fellows about spine surgery. Past courses have focused on the surgical treatment of complex spinal tumors and minimally invasive surgery.

James Mok, MD

Dr. James Mok is a board-certified orthopaedic surgeon who specializes in the diagnosis and treatment of spine conditions, including herniated discs, spinal stenosis, spondylolisthesis and degenerative disc disease. He also cares for patients with cervical stenosis or myelopathy—conditions in which the spinal cord and nerves become compressed in the neck. In addition, Dr. Mok has a special interest in utilizing minimally invasive surgery to speed up recovery times after spine surgery.

Sports Medicine

Sports Medicine Team

Aravind Athiviraham, MD
Sherwin S.W. Ho, MD
Ryan Hudson, MD
Richard W. Kang, MD
Lewis L. Shi, MD

The orthopaedic surgeons at the University of Chicago Medicine offer state-of-the-art sports medicine for all ages and skill levels—from young competitors to weekend athletes to professional players. We offer non-surgical, surgical and rehabilitative options designed to return patients to their full ability and level of play.

The most common problems treated by our sports medicine team are:

Knee problems, including anterior cruciate ligament (ACL) tears, meniscus and cartilage injuries, and problems affecting the kneecap (patella)

Shoulder injuries, including dislocation, rotator cuff tears, swimmer’s/volleyball player’s shoulder, throwing injuries

Hip injuries, including labral tears and femoral acetabular impingement (hip impingement) related to all sports (including gymnastics and dancing)

Hamstring injuries and Achilles tendon

Elbow injuries, such as golfer’s elbow and tennis elbow, ulnar collateral ligament injuries (Tommy John surgery)

Hand and wrist injuries

Sprains and strains

Stress fractures

Arthritis, bursitis and tendonitis

Aravind Athiviraham, MD

A specialist in sports medicine, Dr. Aravind Athiviraham cares for patients with athletic and overuse injuries, as well as other injuries and diseases of the bones, joints and muscles. He is skilled in minimally invasive and arthroscopic procedures of the shoulder, elbow, knee and ankle. In addition, he has received advanced training in reconstructive procedures of the knee and shoulder.

Sherwin S.W. Ho, MD

Dr. Sherwin Ho is an expert in sports medicine, specializing in minimally invasive arthroscopic procedures of the shoulder, elbow, hip, knee and ankle. He has served as faculty at numerous advanced arthroscopic shoulder and knee courses for the American Academy of Orthopaedic Surgeons. Dr. Ho currently serves on the academy’s Board of Councilors and is an official spokesman for the academy.

He has authored numerous medical articles and reference publications. Dr. Ho has served as a co-chief editor of sports medicine for the online publication, *Emedicine*, and is chairman of the annual University of Chicago Primary Care Orthopedics Course.

Ryan Hudson, MD

Dr. Ryan Hudson specializes in sports medicine. In addition to performing general consultations, he diagnoses and treats a wide range of sports-related injuries. Dr. Hudson is experienced in musculoskeletal radiology and ultrasound guided minimally invasive procedures. Whenever possible, he offers his patients non-operative solutions.

Richard W. Kang, MD

Dr. Richard Kang is a board-certified orthopaedic sports medicine surgeon skilled in a variety of minimally invasive and arthroscopic procedures. He specializes in the diagnosis and management of adolescent and adult hip conditions, including labral tears and femoroacetabular impingement. He also has expertise in the treatment of cartilage lesions of the hip, knee and shoulder. By utilizing modern techniques to preserve the natural joint, Dr. Kang’s objective is to delay or prevent the onset of arthritis and the need for a joint replacement. His work is dedicated towards alleviating pain and restoring patients’ quality of life.

Lewis L. Shi, MD

Dr. Lewis Shi is an orthopaedic surgeon who specializes in shoulder and elbow injuries. He maximizes patients’ non-operative management prior to considering surgery. If necessary, he offers minimally invasive (arthroscopic) and open procedures that are appropriate for the patient’s disorders. Dr. Shi’s research focuses on the molecular basis of rotator cuff tear and biomechanics of shoulder arthritis. He also is part of several national and international multi-center studies to improve diagnostic and treatment protocols of shoulder injuries. Dr. Shi teaches medical students, residents and fellows. He has won numerous teaching awards and values his role as an educator secondary only to his role as the patient’s advocate.



Welcome New Faculty

ARAVIND ATHIVIRAHAM, MD



Assistant Professor of Orthopaedic Surgery

A specialist in sports medicine, Aravind Athiviraham, MD, cares for patients with athletic and overuse injuries, as well as other injuries and diseases of the bones, joints, and muscles. He is skilled in minimally invasive and arthroscopic procedures

of the shoulder, elbow, knee and ankle. In addition, he has received advanced training in reconstructive procedures of the knee and shoulder.

Dr. Athiviraham's research focuses on the use of virtual arthroscopic simulators in resident training. His current research interest includes the role of orthobiologics to enhance tendon repair and ligament reconstruction, to optimize patient recovery from surgery and allow early return to sports activity. Dr. Athiviraham recently was awarded a grant from the American Board of Orthopedic Surgery for his work. He has served as faculty at arthroscopic shoulder and knee courses organized by the Arthroscopy Association of North America. He is also a reviewer for the *American Journal of Sports Medicine* and *Arthroscopy: The Journal of Arthroscopic and Related Surgery*. In addition, he has served as a team physician for several professional and college sports teams.

MEGAN MEISLIN CONTI MICA, MD



Assistant Professor of Orthopaedic Surgery

Megan Meislin Conti Mica, MD, is a skilled hand and upper extremity surgeon. She specializes in the treatment of adults and children, including athletes at all levels, with injuries or disorders of the hand, wrist, elbow and shoulder. Dr. Meislin

Conti Mica has expertise in the management of traumatic and post-traumatic reconstructions, as well as treatment of congenital, paralytic, arthritic, infectious, tumorous and acquired conditions affecting the upper extremity and brachial plexus. Additionally, she has advanced training in minimally invasive (arthroscopic) and microvascular (microscopic) techniques.

With a personal interest in international medicine, Dr. Meislin Conti Mica has trained under the instruction of recognized experts from the United States and abroad. She has participated in several international medical missions, along with completing a second traveling fellowship in France and Belgium to augment her training.

Housestaff

Orthopaedic Surgery + Rehabilitation Medicine

ORTHOPAEDIC SURGERY RESIDENTS

PGY-1	PGY-2	PGY-3
Blake Burkert, MD <i>Undergraduate/Graduate</i> Hendrix College/Emory University School of Medicine	Kenneth Chakour, MD <i>Undergraduate/Graduate</i> University of Illinois at Urbana-Champaign/University of Illinois College of Medicine	Harpreet Bawa, MD <i>Undergraduate/Graduate</i> University of California, Los Angeles/Case Western Reserve University School of Medicine
Ravand Khazai, MD <i>Undergraduate/Graduate</i> Northwestern University/University of Missouri-Columbia School of Medicine	Srikanth Divi, MD <i>Undergraduate/Graduate</i> Johns Hopkins University/University of Pittsburgh School of Medicine	Kyle Borque, MD <i>Undergraduate/Graduate</i> Texas A&M University/Baylor College of Medicine
David Landy, MD, PhD <i>Undergraduate/Graduate</i> Vanderbilt University/Dartmouth Medical School & University of Miami Leonard M. Miller School of Medicine	Patrick Leung, MD <i>Undergraduate/Graduate</i> Rutgers University/UMDNJ—Robert Wood Johnson Medical School	Pranay Patel, MD <i>Undergraduate/Graduate</i> Washington University in St. Louis/Southern Illinois University School of Medicine
Michael Perrone, MD <i>Undergraduate/Graduate</i> University of Florida/University of Florida & USF Health Morsani College of Medicine	Jonathan Twu, MD <i>Undergraduate/Graduate</i> University of Illinois at Urbana-Champaign/University of Illinois College of Medicine	Anna Rosenblum, MD <i>Undergraduate/Graduate</i> Harvard College/Albany Medical College
Paul Shultz, MD <i>Undergraduate/Graduate</i> University of Colorado at Boulder/The Warren Alpert Medical School of Brown University	Noelle White, MD <i>Undergraduate/Graduate</i> The University of Western Ontario/Pennsylvania State University College of Medicine	Robert Stewart, MD <i>Undergraduate/Graduate</i> University of Washington/Jefferson Medical College of Thomas Jefferson University

ORTHOPAEDIC SURGERY FELLOWS— 2015 GRADUATES

PGY-4	PGY-5	
Joseph Cohen, MD <i>Undergraduate/Graduate</i> University of San Diego/Tufts University School of Medicine	Erwin Bennett, MD <i>Undergraduate/Graduate</i> Santa Clara University/University of Chicago Pritzker School of Medicine	Anna Avik, DO (Hand and Upper Extremity) Riverside County Regional Medical Center—Moreno Valley, CA
Ananth Eleswarapu, MD <i>Undergraduate/Graduate</i> Columbia University/The University of Pittsburgh School of Medicine	Jimmy Jiang, MD <i>Undergraduate/Graduate</i> Georgia Tech/University of Alabama School of Medicine	Arun Aneja, MD, PhD (Musculoskeletal Oncology) Trauma Fellowship at Wake Forest—Winston-Salem, NC
Oliver Schipper, MD <i>Undergraduate/Graduate</i> Bucknell University/Georgetown University School of Medicine	Min Lu, MD <i>Undergraduate/Graduate</i> University of Chicago/University of Chicago Pritzker School of Medicine	Erycka Florie, DO (Hand and Upper Extremity) New England Orthopaedic Specialists—Peabody, MA
Jason Somogyi, MD <i>Undergraduate/Graduate</i> Illinois Wesleyan University/Loyola University Stritch School of Medicine	Gautam Malhotra, MD <i>Undergraduate/Graduate</i> UCLA/University of Chicago Pritzker School of Medicine	Maged Hanna, MD (Adult Reconstruction) Pediatric Fellowship/Ohio
Cory Stewart, MD <i>Undergraduate/Graduate</i> Calvin College/Wayne State University School of Medicine	Zachary Sisko, MD <i>Undergraduate/Graduate</i> University of Notre Dame/St. Louis University School of Medicine	Kory Johnson, DO (Adult Reconstruction) Orthopaedic Associates of Michigan—Grand Rapids, MI
	Aneet Toor, MD <i>Undergraduate/Graduate</i> UCLA/Ohio State University College of Medicine	Mark Smyth, MD (Sports Medicine) Greenleaf Orthopaedic Associates—Gurnee, IL
		Seung Jin Yi, MD (Sports Medicine) Florida Orthopaedic Institute—Temple Terrace, FL



HONORS & AWARDS

Honors + Awards 2015

The CCD has 240 private inpatient rooms (including 52 intensive care beds) and 28 state-of-the-art operating rooms. Every space is designed to maximize patient care and comfort, and to enable physicians to use the latest technology. For instance, we now use an innovative robotic-arm assisted system, called MAKOplasty® total hip replacement, that offers a new level of precision and accuracy in aligning and placing implants.

Jovito Angeles, MD

Reviewer for the *Journal of Bone and Joint Surgery—British Edition*
Member, Reader Advisory Board of the *Journal of Bone and Joint Surgery*

Aravind Athiviraham, MD

Received an American Board of Orthopedic Surgery Grant to Foster Innovations in Resident Surgical Education; “Can virtual based arthroscopic simulators improve trainee performance?”

Robert Bielski, MD

Board Examiner for the American Board of Orthopaedic Surgery
Reviewer for the *Journal of Bone and Joint Surgery*
Reviewer for the *Journal of Foot and Ankle Surgery*
Reviewer for the *Journal of the American Medical Association*
Reviewer for the *Journal of Pediatric Orthopaedics*
Book Reviewer for the *Journal of the American Medical Association*

Roderick Birnie, MD

Doctors Demystify finger deformities for OTs and PTs
Boutonniere and Swan neck deformities

Douglas R. Dirschl, MD

Member, Own the Bone Steering Committee, American Orthopaedic Association
Member, Budget and Finance Committee, Orthopaedic Trauma Association
Member, Classification Committee, Orthopaedic Trauma Association
Immediate Past President, American Orthopaedic Association, June 2012—June 2013
Reviewer, *Journal of Bone and Joint Surgery*
Editorial Board, *Journal of Orthopaedic Trauma*
Reviewer, *New England Journal of Medicine*
Master Clinician, Bucksbaum Institute

Henry Finn, MD

Editorial Board, *Journal of Arthroplasty*
Oral Examiner, American Board of Orthopaedic Surgery

Rex Haydon, MD, PhD

Associate Editor for *Current Orthopaedic Practice*
Reviewer, *Journal of Bone and Joint Surgery*
Reviewer, *Clinical Orthopaedics and Related Research*
Reviewer, *Journal of Orthopaedic Research*
Reviewer, *Journal of Gene Medicine*
Reviewer, *American Journal of Sports Medicine*
Reviewer, *LifeScience*
Reviewer, *Cancer Research*
Grant Reviewer for the Musculoskeletal Transplant Foundation
Grant Reviewer for the Orthopaedic Research and Education Foundation
Grant Reviewer for the Italian Association for Cancer Research (AIRC)
Delegate-At-Large, Executive Committee, The American Orthopaedic Association

Tong-Chuan He, MD, PhD

Reviewer, *American Journal of Sports Medicine*
Reviewer, *American Journal Human Genetics*
Reviewer, *Cancer Research*
Reviewer, *Clinical Cancer Research*
Reviewer, *Critical Reviews in Oncology/Hematology*
Reviewer, *EMBO*
Reviewer, *EMBO Report*
Reviewer *Gastroenterology*
Reviewer, *Genomics*
Reviewer, *Genes & Development*
Reviewer, *Journal of Clinical Investigation*
Reviewer, *Journal of Orthopaedic Research*
Reviewer, *Laboratory Investigation*
Reviewer, *Molecular and Cellular Biology*
Reviewer, *Nature Biotechnology*
Reviewer, *Nucleic Acids Research*

Reviewer, *Oncogene*
Reviewer *PLoS Series* Journals
Reviewer, Proceedings National Academy of Science, USA
Reviewer, *Science*
Reviewer, *Stem Cells*
Reviewer, *Stem Cells and Development*
Reviewer, Special Emphasis Panel/NIH ZRG1 ONC-K (03) M, June 2010
Reviewer, Biomedical Research Council of Agency for Science, Technology and Research of Singapore (A*STAR), July, 2010
Reviewer, the Wellcome Trust Senior Fellowships, UK, February 2011
Charter Member, the Drug Discovery and Molecular Pharmacology (DMP) Study Section, NIH/NCI, Bethesda, MD
Editorial Board, *Recent Patent Reviews on Anti-Cancer Drug Discovery*
Editorial Board, *Laboratory Investigation*
Editorial Board, *The Open Cancer Journal*
Editorial Board, *The Open Tissue Engineering & Regenerative Medicine Journal*
Guest Editor, *Current Gene Therapy*
Editorial Board, *World Journal of Stem Cells*
Editorial Board, *World Journal of Biological Chemistry*
Editorial Board, *World Journal of Orthopaedics*
Editorial Board, *American Journal of Stem Cells*

Sherwin S.W. Ho, MD
Head Team Physician for Concordia University
Head Team Physician for China National Women’s Volleyball team, as well as a Team Physician for USA Volleyball Women’s National team
Team Physician, University of Chicago, Chicago, IL
Orthopaedic Consultant, Academy of Movement and Music, and Momenta Dance Company, Oak Park, IL

Richard Kang, MD
Team Physician for Kennedy King College

Michael Lee, MD
Co-Chair, AO North America Principles and Treatments of Spinal Disorders for Residents Course, Las Vegas, NV August 15–16, 2014
Co-Chaired (Assistant Director) with Drs. Sherwin Ho and Richard Kang, the course “Primary Care Orthopaedics: A Review of Basic and Current Concepts,” Chicago, IL Jun 15–17
Invited Faculty, University of Chicago CHeSS Research Proposal Development Workshop Summer Program in Outcomes Research Training (SPORT) for residents and junior faculty
AAOS Orthopaedic Oral Boards Review Course, Rosemont, IL, May 15–16, 2015
Invited Speaker, MIS TLIF: Advantages and Limitations. Advanced Techniques in Less Invasive Spine Surgery, Seattle, WA, June 12, 2015
Invited Faculty, MIS TLIF-Indications, Techniques and Outcomes, Lumbar Spine Research Society, Chicago, IL, April 9, 2015
Invited Faculty, AOSpine North America Principles and Treatments of Spinal Disorders for Residents Course, Las Vegas, NV, Oct 10, 2014
Invited Faculty, Innovative and Advanced Surgery of the Degenerative and Deformed Lumbar Spine. St. Louis University, St. Louis, MO, Oct 4, 2014
Invited Faculty, AAOS/LSRS Lumbar Spine Cutting Edge Surgical Techniques #3053, Rosemont, IL, September 18–19, 2014

Hue H. Luu, MD
Grant Reviewer for The American Cancer Society Cell Structure and Metastasis (CSM) Study Section (Ad Hoc) (Atlanta, GA)
Grant Reviewer for the Orthopaedic Research and Education Foundation
Grant Reviewer for the University of Chicago Internal Scientific Advisory Panel
Grant Reviewer for Liddy Schriver Sarcoma Initiative (Ad Hoc) (Ossining, NY)
ABC Fellowship by the American Orthopaedic Association

John Martell, MD
Abstract Reviewer for Orthopaedic Research Society, Section of Arthroplasty
Reviewer, *Journal of Wear*
Reviewer, *Journal of Bone and Joint Surgery*
Manuscript reviewer for *Clinical Orthopaedics and Related Research*
Grant Submission Reviewer for the National Institutes of Health
Manuscript reviewer, *Journal of Biomechanics*
Manuscript reviewer, *Computer Methods in Biomechanics and Biomedical Engineering*
Manuscript reviewer, *Journal of Biomaterials*
Manuscript reviewer, *Journal of American Academy of Orthopaedic Surgeons*

Daniel Mass, MD
Recipient of the Gerald R. Laros, MD, Teaching Award for 2013

Bruce Reider, MD
Continues in his role as editor of the *American Journal of Sports Medicine*
Board of Directors, American Orthopaedic Society for Sports Medicine
Reviewer, *The Physician and Sports Medicine*
Reviewer, *World Book Encyclopedia*
Reviewer, *Journal of Orthopaedic Research*
Consultant Editor, *Post-Grad Advances in Sports Medicine*, Publisher Forum Medicus, Inc.
Reviewer, *American Journal of Sports Medicine*
Reviewer, *Clinical Journal of Sports Medicine* (Canada)
Reviewer, *AAOS Sports Medicine Evaluation*
Editorial Board, *Operative Techniques in Sports Medicine*
Reviewer, *Orthopaedics Today*
Reviewer, *Arthroscopy*
Reviewer, *Clinical Orthopaedics and Related Research*
Invited Speaker: Indian Sports Medicine Society Congress (IASMCON) Mumbai, India
Invited Speaker: Asia-Pacific Knee, Arthroscopy, and Sports Medicine Society (APKASS) Summit, Taipei Taiwan and Sociedad Española de Traumatología del Deporte (SETRADE), Alicante, Spain

Lewis Shi, MD
Awarded the Laros Teaching Award for 2015 by the residents for his outstanding teaching skills
Member, AAOS Video Theater Committee, March 2014 through March 2016

Michael Simon, MD
Continues in his role as the associate dean of graduation medical education and DIO at the University of Chicago

Christopher Sullivan, MD
Reviewer, *Clinical Orthopaedics and Related Research*

Brian Toolan, MD
Oral Examiner for Part II Oral Boards and Oral Recertification for the American Board of Orthopaedic Surgery.
Manuscript Reviewer, *American Journal of Sports Medicine*
Current Concepts & Topical Reviews Committee, Assistant Editor for *Foot and Ankle International*
Foot and Ankle International, Assistant Editor, Current Concepts & Topical Reviews
Member, Council of Orthopaedic Residency Directors Governing Committee
AOA Representative, Council of Medical Specialty Societies Organization of Program Director Associations
Member-at-Large, AOFAS Board of Directors
Co-Chair, OMeGA Medical Grants Association, Foot & Ankle Fellowship Grant Review Committee
Member, OMeGA Medical Grants Association, Residency/General Education Grant Review Committee
University of Chicago Dean’s Advisory Committee on Appointments and Promotions (COAP)



This healing environment for patients is also the ideal facility to train tomorrow's orthopaedic specialists. Residents and fellows learn to practice medicine using advanced technology and incorporating innovations such as genetically personalized medicine and informatics. They work with leading researchers on campus and conduct their own game-changing research. The Center for Care and Discovery is a place that will shape the future of medicine.

EDUCATION

Working toward fulfilling the Department of Orthopaedic Surgery and Rehabilitation Medicine's mission to communicate knowledge through medical education, our faculty continue to be active in all levels of medical education. During the M3 year, we provide a core course for three hours, which includes instruction in casting and splinting, and a series of interactive lectures on orthopaedic topics. During their surgery clerkship, third-year medical students are given the option of selecting orthopaedic surgery as their subspecialty rotation for 2.5 weeks. During this rotation, the junior medical students are introduced to the field of orthopaedics and given the opportunity to experience first-hand the rewarding yet challenging work we do.

During the M4 year, we offer a four-week elective inpatient rotation. Students are exposed to the various orthopaedic subspecialties during this rotation. In addition to our own students from Pritzker, this rotation is very popular with visiting students from other institutions as well. We also offer an outpatient elective, which is aimed towards students entering into primary care fields. Year after year, we continue to see many of our own students choose orthopaedics as a career.

Our residency program continued to flourish over the past year and has been greatly strengthened by the academic affiliation with the NorthShore University HealthSystem (NSUHS). Through our affiliation with NorthShore, our residents rotate at Evanston Hospital, a designated Level I trauma center and Glenbrook Hospital, a community hospital in Glenview, Ill. All members of the NSUHS faculty are fellowship-trained subspecialty surgeons in well-established community practices. The individual practices of the faculty collectively provide an extensive, subspecialty-driven ambulatory experience in the evaluation and management of outpatient orthopaedic conditions. We have five residents training at NSUHS at a time on the total joint arthroplasty, foot & ankle, trauma, hand and spine services.

The majority of the resident educational program in orthopaedic surgery continues to occur at the University of Chicago Medicine. The clinical education is centered

around inpatient units, on-site and off-site outpatient clinics, and the operating room. The management of patients is divided into eight clinical services that feature joint reconstruction, including hip preservation, spine, oncology, pediatrics, foot and ankle, hand and upper extremity and sports medicine. Our curriculum is organized through these subspecialties and teams of residents are assigned to each service.

The didactic portion of the residents' education occurs mainly through the morning clinical conferences. Our 6:15 am conference is a monthly rotating conference on pediatric orthopaedics, trauma, basic science, morbidity and mortality, quality assurance, sports medicine, adult reconstruction, hand and upper extremity, spine and surgical indications for musculoskeletal diseases. All of our conferences are attended and lead by attendings. Following the 6:15 am conferences, every weekday morning from 7:00 to 7:30 am, the junior resident on-call presents the emergency room cases from the evening before. This step serves as quality control and an educational experience for residents. After the emergency room review, all faculty are required to present their operative cases for the day and explain their operative indications. Following the faculty presentation, residents show radiographs of patients who were operated on the day before, so that all individuals can see some of the technical results from the previous day's surgery. In addition to our daily morning conferences, we also have a weekly Grand Rounds on Wednesdays and a monthly Journal Club. We are fortunate to have a large number of outside guest speakers present at our Grand Rounds.

Our four fellowship programs—Hand & Upper Extremity, under the direction of Dr. Daniel Mass; Sports Medicine, under the direction of Dr. Sherwin Ho; Musculoskeletal Oncology, under the direction of Dr. Rex Haydon; and Adult Reconstruction, based at Weiss Memorial Hospital, under the direction of Dr. Henry Finn—continue to train some of the nation's brightest, emerging orthopaedic subspecialists. Staying at the forefront of orthopaedic medical education is a goal the Department of Orthopaedic Surgery and Rehabilitation Medicine strives for at every level of education.

NORTHSHORE ORTHOPAEDIC PROGRAM

The orthopaedic program at NorthShore University HealthSystem is a valuable and robust component of the orthopaedic surgery graduate medical education program at the University of Chicago Medicine. Five residents rotate continually through the NorthShore Orthopaedic Department with subspecialty rotations in total joint, foot and ankle, hand, trauma and spine. Currently U of C and NorthShore Orthopaedic Departments facilitate two combined fellowship programs; sports medicine, and hand and upper extremity. Live daily interactive video provides linkage and continuity to the University of Chicago campus. Daily conferences on the NorthShore campus complement the U of C programs with hand, trauma, surgical outcomes, arthroscopic correlation, journal club and spine conferences. Residents have the opportunity to interact with numerous clinical faculty and gain experience and exposure through the NorthShore Orthopaedic outpatient clinic, operating rooms, Evanston Hospital (level 1 trauma) ER, Ravine Way surgicenter and clinical offices of the faculty. They also participate in sub-specialty specific motor skills education programs in the NorthShore Orthopaedic Psychomotor Skills & Virtual Reality Laboratory featuring state-of-the-art skills education in trauma and arthroscopic surgery.

REHABILITATION MEDICINE

Rehabilitation Medicine physicians work with other rehab professionals to restore or maximize each patient's functional skills, self-sufficiency and mobility. Physical medicine and rehabilitation is often thought of as the “quality of life” specialty, adding both life to years and years to life. Our physiatrists lead interdisciplinary teams that include nurses, physical therapists, occupational therapists, speech-language pathologists, case managers and others. These teams develop individualized treatment plans to address each patient's rehab needs. Treatment plans also focus on the patient's longer term functional goals once they're home in the community.

These doctors provide patient care on an inpatient and outpatient basis. They also participate in various teaching activities for Schwab's fully accredited residency training



Another integral component of the residency and fellowship programs is the real-world experience gained through managing the NorthShore Community Health Center (CHC) clinics. Residents manage two clinics per week while hand and sports fellows each manage one clinic per month. The orthopaedic faculty and CHC co-directors provide overall supervision for the clinics. The CHC Clinic offers residents and fellows the opportunity to assess and treat varying orthopaedic conditions from a wide patient population in preparation for their future practices.

Annual Trauma Cadaver Course

Dr. David Beigler, the Division Head for Trauma in Orthopaedic Surgery at NorthShore, led another successful trauma course for the U of C orthopaedic residents on September 18 & 19, 2015. This is year four for this annual course. Our generous sponsors, DePuy Synthes, funded the entire course. The 2015 course was titled “DePuy Synthes SMART Lab” and welcomed 12 residents. Dr. Beigler served as faculty and organizer for the course. The program includes step-by-step surgical dissection for accessing orthopaedic traumas as well as identification and use of implants. The two-day course continues to be well-received as a valuable part of the residency program.

program in physical medicine and rehabilitation with the University of Chicago Pritzker School of Medicine.

At the University of Chicago, our physical medicine and rehabilitation specialists are involved in many educational and clinical pursuits. Dr. Mary Lawler serves as advisor to Pritzker students who are interested in physical medicine and rehabilitation as a specialty. Dr. Lawler also works with Dr. Cheryl Benjamin covering inpatient psychiatry consultations at the University of Chicago. Dr. Michelle Gittler is the Resident Program Director at Schwab Rehabilitation Hospital and clinical associate professor at the University of Chicago.

2016 WEEKLY CONFERENCE

SCHEDULE

University of Chicago Orthopaedic Residency Program

Day	Place	Description	Time
Monday	CCD 7750	OITE Review/Anatomy	6:30–7:00 AM
	CCD 7750	AM Intake Conference	7:00–7:15 AM
Tuesday	CCD 7750	Clinical Conference	6:15–7:00 AM
	CCD 7750	AM Intake Conference	7:00–7:15 AM
Wednesday	E 302	Basic Science	6:15–7:00 AM
	E 302	Chairman/PD/Resident Meeting	7:00–7:20 AM
	E 302	Grand Rounds	7:30–8:15 AM
	E 302	AM Intake Conference	8:15–8:30 AM
Thursday	CCD 7750	Indications	6:15–7:00 AM
	CCD 7750	AM Intake Conference	7:00–7:15 AM
Friday	CCD 7750	Clinical Conference	6:15–7:00 AM
	CCD 7750	AM Intake Conference	7:00–7:15 AM

Conference Details

AM Intake Conference

Pre-Op & Post-Op Discussion
X-Ray Review from Previous Day
ER X-Ray Review

Monthly Conference

Journal Club
Last Wednesday of Each Month
7:00 AM—E 302

Ethics

One Wednesday Quarterly—7:00 AM

Vignettes in Ethics and Professionalism Compliance Education Annually

Liability Education Annually
Prosthetic Education Annually
Cultural Competence Vignettes

Wednesday

Basic Science Conference

July–Sept	Anatomy
Sept–Dec	Pathology
Jan–June	Basic Science Curriculum

Thursday

Indications Conference

Topics are covered on a rotating basis
Trauma, Adult Reconstruction, Sports, Hand, Pediatrics and Foot & Ankle

Tuesday & Friday

Clinical Conferences

Topics are covered on a rotating basis
Trauma, Morbidity & Mortality, Adult Reconstruction, Pediatrics, Hand, Sports, Foot & Ankle and Spine



The hospital structure features a grid system based on cubes or “bays” that can be repurposed to meet changing needs or adapt to new technology. Each floor is organized into 85 modular cubes that measure 31.5 feet across and 18 feet high. One cube can accommodate one interventional procedure room, one operating room or two patient rooms—all without changing the building’s basic framework.

ORTHOPAEDIC RESEARCH ENDEAVORS

The goals of our research endeavors are to create new knowledge, to inspire others to create new knowledge, to incorporate understanding and application of investigative methods into the fabric of our educational programs, and to make a substantive impact on where orthopaedic care will be in the future. Basic, clinical and translational research in orthopaedic science is an integral part of our graduate medical education. Thus, in addition to the clinical and educational commitments, our faculty is actively involved in a broad range of research on bone and musculoskeletal diseases. Research endeavors have been grouped in thematic areas; for a listing of publications or presentations unique to faculty members, please see page 36 of this Annual Report.

The Orthopaedic Biomedical Imaging Institute under the direction of **John Martell, MD**, continues to shape the present and future of image processing in orthopaedic practice. The Institute’s projects have been funded by grants from **The Harris Foundation, NIH/NIAMS, Smith & Nephew, Stryker, Biomet** and **Zimmer**. The Orthopaedic Biomedical Imaging Institute is known nationally and internationally as a resource for the most innovative and accurate techniques for non-invasively measuring polyethylene wear in total hip and knee replacements. Additionally, it will become one of the international leaders, in collaboration with other scientists at the University of Chicago, in linking genomic information to imaging information to musculoskeletal disease to the outcomes of orthopaedic care – an endeavor we are calling ‘radiomics.’

Dr. Martell accommodates requests from academic joint replacement programs to observe the techniques that are used in processing and analyzing films. The Institute has become a world-class resource for the analysis of polyethylene wear in total hip arthroplasty, and researchers, orthopaedic practitioners and implant companies contract with the Institute to do the analysis of polyethylene wear in their total joint implants.

Dr. Martell has recently developed mechanical analysis software that allows investigators to estimate the joint reaction force and stress in normal and prosthetic hips. Using the joint stress as a predictor variable in combination with patient activity indicators (speed of walking, UCLA score or pedometer data), he has developed a multiple-logistic regression model that can identify patients with total hips that are at risk for high wear and osteolysis in the long term. This model is now 87 percent accurate and has no false negatives in a series of 300 hips with minimum eight-year follow-up.

He has partnered with **Dr. Christian Heisel** at Heidelberg University in Germany to investigate the biomechanical factors predisposing women to hip arthritis. Preliminary results show a significantly higher contact stress in the native hips of women patients compared to men. Factors that play a role in this finding are: a wider female pelvis, causing the body weight momentum to be larger; smaller femoral offset in women; and smaller femoral heads, which increases contact stress. **Dr. Martell** is also working with **Dr. William Walters** from Australia to investigate the biomechanics of ceramic total hip arthroplasty to identify factors leading to squeaking in ceramic total hip arthroplasty.

Dr. Martell, in partnership with Argonne National Laboratories, has received \$20,000 through the BIASE initiative to fund a pilot project to develop a visual-tactile feedback system for use in minimally invasive robotic surgery. Preliminary testing of this video processing image analysis system has shown the capability to detect real-time suture strain rates that are 100 times lower than the strain to failure. Work now continues on perfecting the video processing, including measuring strains in sutures from archived clinical videos.

Drs. Douglas Dirschl and **Martell**, in collaboration with **Maryellen Giger, PhD**, in radiology, have recently begun work on a line of investigation that has the potential to change our ability to predict orthopaedic disease and

could lead to orthopaedic treatment customized to the individual. This broad line of research, termed radiomics, leverages expertise at the University of Chicago in genomics, image processing and large data management, and merges these with musculoskeletal expertise in a way that may have a profound impact on patients. There is a wealth of information in the human genome that is largely untapped; there is also a wealth of morphologic and textural information in x-rays of the human skeleton; finally, the ubiquitous nature of both genomic and imaging information allows the application of big data analytic techniques to these sources of data all intersecting around the prevalence, progression and treatment of musculoskeletal disease. The collaborators have recently submitted a grant application to the NIH to fund the early and heavily analytical phases of this research.

For example, imagine very large databases of genomic information (DNA) and pelvic x-rays. By utilizing big-data analytic and imaging processing techniques, we will be able to link specific genomic patterns to specific morphological and textural patterns in the pelvis. With a bit of longitudinal data, then, this technology will enable the correlation with and prediction of arthritis of the hip joint. Further application of this information will indicate which management techniques (whether surgical or nonsurgical) have the greatest success in individuals with certain genomic and morphologic patterns, which could lead to customized treatments for arthritis in individuals – all based on data that can be obtained from a drop of blood and a pelvic x-ray. We have great enthusiasm for this line of inquiry.

Tendon and Ligament Injury Repair

Drs. Daniel Mass, Sherwin Ho, Lewis L. Shi, and Jovito Angeles, in collaboration with **Dr. T.C. He**, are investigating possible gene therapy approaches to enhancing tendon and ligament healing using recombinant adenoviral vectors expressing BMPs and/or other biological factors. They have demonstrated that BMP-13 can significantly improve the biomechanical properties of lacerated flexor tendons in a rabbit model, while BMP-14 is also shown to significantly improve the biomechanical properties of lacerated flexor tendons in a rabbit model. Based on time-course studies of gene expression after tendon injury, they identified

several factors that may work alongside BMP-13 and BMP-14 at different stages of tendon healing. **Dr. Lewis L. Shi** is also investigating biological factors that may improve the healing of rotator cuff injuries.

Dr. Shi is leading an active shoulder research program, with multiple clinical and translational projects. In collaboration with **Dr. He**, he is investigating biological factors that may improve the healing of rotator cuff injuries. He has an ongoing IRB-approved study examining patients undergoing shoulder arthroscopy, correlating the growth factors of the subacromial milieu to the condition and chronicity of cuff tears. The ultimate goal is to identify potential pharmacologic treatment to augment rotator cuff repairs in human patients.

Dr. Brian Toolan is interested developing a better understanding of the ruptured Achilles tendon healing process and potentially developing new means of treating patients with this injury. Achilles tendon ruptures are common injuries, and both surgical and non-surgical treatments have frequent complications, such as wound dehiscence and re-rupture. Therefore, **Dr. Toolan**, in collaboration with **Dr. He**, has used a rat model to investigate the effects of BMP-14 and other factors on Achilles tendon healing, finding a 70 percent increase in tensile strength at two weeks.

In addition, **Drs. Ho** and **Richard Kang** are investigating the potential use of BMP-13 and/or platelet-rich plasma (PRP) for rotator cuff tears using a rat model, as possible treatment options for patellar tendonitis, and a unique approach to rehabilitation following ACL reconstruction surgery.

Dr. Bruce Reider is also engaged in an ongoing clinical prospective cohort study of possible links between knee proprioception in collegiate soccer and basketball players. His previous research has shown that athletes with ACL tears have abnormal proprioception of the knee that returns to normal after ACL reconstruction. The current project prospectively measures proprioception in a large number of healthy athletes to see if those who go on to tear their ACLs have deficient proprioception prior to the injury. **Dr. Reider** has also completed a study of degenerative meniscal tears, which has been submitted for publication.

Articular Cartilage Regeneration

The sports medicine research program has been intensively investigating the biological processes in articular cartilage regeneration. Articular cartilage has little intrinsic capacity to repair itself after injury, prompting many researchers to explore new methods to facilitate and augment cartilage regeneration. Currently, a variety of approaches have been developed, including chondroplasty, osteochondral transfer procedures (autologous and allograft procedure), microfracture and autologous cultured chondrocyte implant. Each of these techniques is useful when utilized in appropriate conditions; however, a significant cohort of patients still fail to achieve good to excellent results even when surgical, pharmacologic and physical therapy are optimal by current standards. These clinical failures suggest that new biologic strategies, including gene therapy, may be a useful adjunct to current treatments to further improve clinical outcomes.

Drs. Sherwin Ho and **Richard Kang** are investigating the possible use of Sox9 and/or other biofactors to facilitate articular cartilage regeneration. Previously, **Drs. He** and **Rex C. Haydon** successfully transduced intervertebral disc cells with Sox9, a transcription factor necessary for chondrogenesis and Type II collagen synthesis. They observed that human degenerative intervertebral disc cells transfected with Sox9 genes led to chondrocyte proliferation with increased production of Type II collagen. Currently, **Drs. Ho** and **Kang** are investigating whether exogenous expression of Sox9 in articular cartilage cells or in mesenchymal stem cells will augment articular cartilage repair in a rabbit model. This research has included experiments comparing different man-made scaffolds that can be used to implant these genetically altered cartilage cells back into the host knee defects.

Osteosarcoma is a “Differentiation Disease”

Under the direction of **Drs. He, Haydon**, and **Hue H. Luu**, the **Molecular Oncology Laboratory** has focused on the molecular aspects of bone and soft tissue tumors through collaborations with **Drs. Michael A. Simon** and **Anthony Montag**. They previously found that β -catenin signaling is activated in approximately 70 percent of human osteosarcoma samples, suggesting that deregulation

of β -catenin may play a role in the development of human osteosarcoma. They examined the expression of the S100A6 in human osteosarcoma, and found that approximately 84 percent of the analyzed osteosarcoma specimens stained positive for S100A6. Thus, their findings suggest that S100A6 may be associated with the pathogenesis of osteosarcoma. More recently, **Drs. Haydon, Luu** and **He** found that, while in mesenchymal stem cells BMP-2 and BMP-9 induce osteogenic differentiation, osteosarcoma cells are refractory to BMP-induced bone formation with increased cell proliferation, suggesting that blocks to normal BMP-induced differentiation must exist. Downstream targets of the osteogenic BMPs include several key inhibitors of differentiation that are commonly expressed in human tumors. The researchers hypothesize that that osteosarcoma may represent a “**disease of differentiation**,” possibly caused by the defects in the terminal differentiation pathway of pre-osteoblast and/or osteoblasts. They are attempting to reconstruct osteosarcoma-like cells from mesenchymal stem cells by disrupting the differentiation pathway and enhancing proliferation activity of the progenitors. Consistent with the “disease of differentiation” model, generic differentiation agents, such as PPAR agonists and retinoic acids, were shown to promote osteogenic differentiation and inhibit osteosarcoma tumor growth.

Drs. He, Haydon and **Luu** developed a novel orthotopic tumor model for osteosarcoma progression and pulmonary metastasis. This model highlights different stages of primary bone tumor progression and the eventual development of pulmonary metastasis. Researchers are currently using this model to investigate several genes for their role in controlling bone tumorigenesis and metastasis. Meanwhile, they have conducted gene-profiling analysis of gene expression patterns between non-metastatic and highly metastatic osteosarcoma cells, and have identified several promising candidate genes associated with pulmonary metastasis of osteosarcoma. Further functional characterization of these target genes is currently ongoing. They have recently reported that insulin-like growth factor binding protein 5 (IGFBP5) suppresses tumor growth and metastasis of human osteosarcoma.

As natural products and herbs represent a great deal of resources for drug discovery, we have collaborated with **Dr. Chun-Su Yuan** of the **Tang Center for Herbal Medicine Research** and investigated the effect of several herbal products, such as berberine and ginseng extracts, on cancer growth and proliferation, as well as on stem cell differentiation. Dr. He was one of the PIs on a PO1 grant from the NIH to study the role of herbal products in cancer.

The **He, Haydon** and **Luu** group previously demonstrated that Wnt/ β -catenin signaling is de-regulated in over 70 percent of human osteosarcomas. The **He, Haydon** and **Luu** lab has demonstrated that normal Wnt/ β -catenin signaling is required for BMP-9 signaling in MSCs. They have completed a microarray analysis on the genes regulated by Wnt3A in mesenchymal stem cells, and found that CTGF is also highly regulated by Wnt. They have recently finished a study in which they demonstrate that CTGF is a mutual target of Wnt and BMP-9 and plays an important role in regulating osteogenic differentiation. Furthermore, **Drs. He, Haydon** and **Luu** have recently investigated the potential synergistic effect of other factors on BMP-9-mediated osteogenic differentiation and bone formation. Such factors include retinoid receptors and IGFs.

Molecular Biology of Bone Formation and the Role of BMP-9
Although several BMPs (mostly BMP-2 and BMP-7) have been shown to induce bone formation, it is unclear whether the ones currently used represent the most osteogenic BMPs. Through a comprehensive analysis of the 14 types of human BMPs, the **He, Haydon**, and **Luu** lab previously demonstrated that BMP-2, BMP-6, and BMP-9 are the most potent osteogenic BMPs in osteoblastic progenitor cells. They have concluded several rounds of in vivo studies and found that BMP-2, BMP-6 and BMP-9 are the most potent osteogenic BMPs at inducing orthotopic bone formation in athymic mice. Interestingly, they have also found that osteogenic BMPs can induce adipogenic differentiation of mesenchymal stem cells. They have demonstrated that TGF β /BMP type I receptors ALK1 and ALK2 are essential for BMP-9-induced osteogenic signaling in mesenchymal stem cells.

To identify potentially important mediators of BMP-induced osteogenic signaling, **Drs. He, Haydon** and **Luu** determined the transcriptional differences between three osteogenic BMPs (i.e., BMP2, 6, and 9) and two inhibitory/non-osteogenic BMPs (i.e., BMP3 and 12). Through the microarray analysis in pre-osteoblast progenitor cells, they found that expression level of 203 genes (105 up-regulated and 98 down-regulated) was altered >2-fold upon osteogenic BMP stimulation. Gene ontology analysis revealed that osteogenic BMPs, but not inhibitory/non-osteogenic BMPs, activate genes involved in the proliferation of pre-osteoblast progenitor cells towards osteoblastic differentiation, and simultaneously inhibit myoblast-specific gene expression. Their findings are consistent with the notion that osteogenesis and myogenesis are two divergent processes. The **Molecular Oncology Lab** identified several potentially signaling mediators of BMP-induced osteogenesis. Several such downstream targets are the Inhibitors of DNA binding/Differentiation helix-loop-helix (Id proteins), connective tissue growth factor (CTGF), Hey1 and growth hormone. Their studies thus far have demonstrated that both Ids, CTGF, Hey1 and growth hormone play an important role in BMP-9-induced osteogenic signaling.

Evaluating the Value of Musculoskeletal Care: Clinical Effectiveness and Outcomes Research
We endeavor to be leaders in shaping the national discussion of the future direction of musculoskeletal care. In collaboration with other centers within the BSD (the Center for Health and the Social Sciences, the Department of Public Health Sciences and the Center for Research Informatics) across the UChicago campus (Booth School, Harris School and others), we have embarked on a program of investigation, presentation, discussion and publication of a wide variety of projects aimed at, in a variety of ways, making meaningful statements about the value of musculoskeletal and orthopaedic care in the United States.

Dr. Lewis L. Shi is leading several multi-center shoulder clinical outcome studies. These are prospective randomized control trials studying the optimal methods of treatment for rotator cuff tears, biceps tendonitis and labrum tears.

Dr. Douglas Dirschl is a participant in numerous multi-center outcome studies of a variety of orthopaedic traumatic conditions, including mangled limbs, blast injuries, chronic infections of bone and high-energy fractures of the tibia.

A number of faculty, residents and fellows have conducted, presented and published research projects that provide answers to important clinical questions in orthopaedic surgery—and do so with a power and statistical significance that is outstanding, due to the use of large data sets that enable sample sizes that can number in the hundreds of thousands or even millions. In the past academic year, departmental members have presented or published projects derived from a large variety of sources of national data: the National Inpatient Sample, the National Surgical Quality Improvement Project, the MarketScan Commercial and Medicare Claims database, the National Transportation Safety Board database and many others. These large databases enable careful examination of very large numbers of subjects: for example, 130,000 patients who sustained fragility fractures, 244,000 patients who underwent knee replacement, 88,000 patients who suffered peritrochanteric femur fractures, and so on. Detailed information on not only the clinical course of subjects, but of the healthcare costs associated with each treatment and each diagnosis, allow researchers to make very powerful statements about the value of orthopaedic care and to compare various forms/techniques of care.

Additionally, we have assembled patient-reported outcomes data from a variety of national sources as well. This information has enabled us to investigate, with a power that we could not replicate with a multi-center prospective trial, topics such as the outcomes of physical therapy for back and neck pain, patient perceptions about shoulder or knee surgery, and how various orthopaedic treatments affect patient-perceived health and well-being.

Numerous department members have been engaged in these efforts, and more become engaged with each passing month. Faculty members actively participating in this line of investigation in the past academic year include

Drs. Douglas Dirschl, Lewis Shi, and Michael Lee. Residents engaged include **Drs. Harpreet Bawa, Jimmy Jiang, Min Lu, Joseph Cohen, David Landy, Ananth Eleswarapu** and **Srikanth Divi**. Approximately 15 Pritzker School of Medicine students also participated in these investigations.

This line of inquiry will continue to grow as we assemble more and more sources of clinical and financial information. We are currently actively pursuing, with our collaborators, statistical methods by which we can marry data from a variety of large databases to make even more impactful statements about orthopaedic care that we feel will help inform providers and policymakers nationally about what are the most appropriate and successful treatment interventions.



Dr. Mubarak, faculty and residents enjoyed dinner at the Oriental Institute on campus following the lecture.

Scott Mubarak, MD

Dr. Scott Mubarak is a nationally recognized pediatric orthopaedic surgeon, noted for his work in infant hip dislocation, foot deformities and tarsal coalition, clubfeet, muscular dystrophy, cerebral palsy, trauma and compartment syndromes. His orthopaedic training took place at the University of California, San Diego. Following residency, he completed a pediatric orthopaedic fellowship at the Hospital for Sick Children in Toronto, Canada under the leadership of Robert Salter and Norris Carroll, MD.

Dr. Mubarak has authored about 150 peer review journal articles, 40 book chapters, and a textbook entitled “Compartment Syndromes and Volkmann’s Contracture.” Some of his noteworthy publications include: (1) *Pitfalls in the Use of the Pavlik Harness for Treatment of Congenital Dysplasia, Subluxation and Dislocation of the Hip*, (2) *The*

San Diego Pelvic Osteotomy, (3) *Calcaneal, Cuboid and Cuneiform Osteotomies for Valgus Foot Deformities*, and (4) *Treatment of Tarsal Coalition of the Foot*. Altogether, Dr. Mubarak has described or co-authored more than 25 procedures useful in the field of pediatric orthopaedics.

Honors

Dr. Mubarak has been the recipient of numerous honors and awards including: President of Pediatric Orthopaedic Society of North America (POSNA), the American Academy of Orthopaedic Surgeons’ Kappa Delta Award for research on compartment syndromes and muscle pressure measurement, and the Walter Blount Pioneer Award for the outstanding clinical scientific paper on muscular torticollis at POSNA.

Graduating Residents

(Left, top to bottom)

Erwin Bennett, MD

Erwin will be going to MedStar Union Memorial Hospital in Baltimore, MD for a foot and ankle fellowship under Lew C. Schon, MD, Program Director.

Jimmy Jiang, MD

Jimmy will be returning to the University of Chicago Medicine for a hand and upper extremity fellowship under Daniel P. Mass, MD, program director.

Min Lu, MD

Min will be going to the University of California, San Francisco, for an adult reconstructive surgery fellowship under Erik Hansen, MD, Program Director.

(Right, top to bottom)

Gautam Malhotra, MD

Gautam will be returning to the University of Chicago Medicine for a hand and upper extremity fellowship under Daniel P. Mass, MD, program director.

Zachary Sisko, MD

Zachary will be going to the University of Western Ontario, London Health Sciences Center for an adult reconstructive surgery fellowship under Richard McCalden, MD, FRCSC, Program Director.

Aneet Toor, MD

Aneet will be going to Kerlan Jobe Orthopaedic Clinic in Los Angeles for a sports medicine fellowship under Neal S. ElAttrache, MD, Program Director.



This year’s AAOS Annual Meeting will be held in Orlando, Florida, March 1-5, 2016. The University of Chicago Department of Orthopaedic Surgery and Rehabilitation Medicine Annual Alumni Reception is being held at the DoubleTree by Hilton Orlando at SeaWorld, 10100 International Drive, Orlando, FL, on Friday, March 4, 2016 from 6:30-8:30 p.m. in Coral B. I hope to see you there.

Sincerely,

Douglas R. Dirschl, MD

Lowell T. Coggshall Professor and Chairman
Department of Orthopaedic Surgery
and Rehabilitation Medicine
The University of Chicago Medicine
and Biological Sciences

Publications +Presentations 2015

Jovito Angeles, MD

Joseph D. Lamplot*, Bo Liu*, Liangjun Yin, Wenwen Zhang, Zhongliang Wang, Gaurav Luther, Eric Wagner, Ruidong Li, Guoxin Nan, Wei Shui, Zhengjian Yan, Richard Rames, Fang Deng, Hongmei Zhang, Zhan Liao, Wei Liu, Junhui Zhang, Zhonglin Zhang, Qian Zhang, Jixing Ye, Youlin Deng, Min Qiao, Rex C. Haydon, Hue H Luu, **Jovito Angeles**, Lewis L. Shi, Tong-Chuan He#, and Sherwin H. Ho# (2014) Reversibly Immortalized Mouse Articular Chondrocytes Acquire Long-Term Proliferative Capability while Retaining Chondrogenic Phenotype. *Cell Transplantation* 2014 May 2. [Epub ahead of print] PMID: 24800751

Aravind Athiviraham, MD

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Tong-Chuan He, MD, PhD

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12th Annual University of Chicago Primary Care Sports Medicine Conference: "Hip Pain in Athletes", Hip Examination Workshop Feb. 2015

Orthopaedic Summit 2014: Evolving Techniques in Sports Medicine Faculty for Ultrasound Workshop. Las Vegas, NV December 2014

SONOSITE: Ultrasound CME Course with cadaver lab Workshop Faculty. Chicago, IL October 2014

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