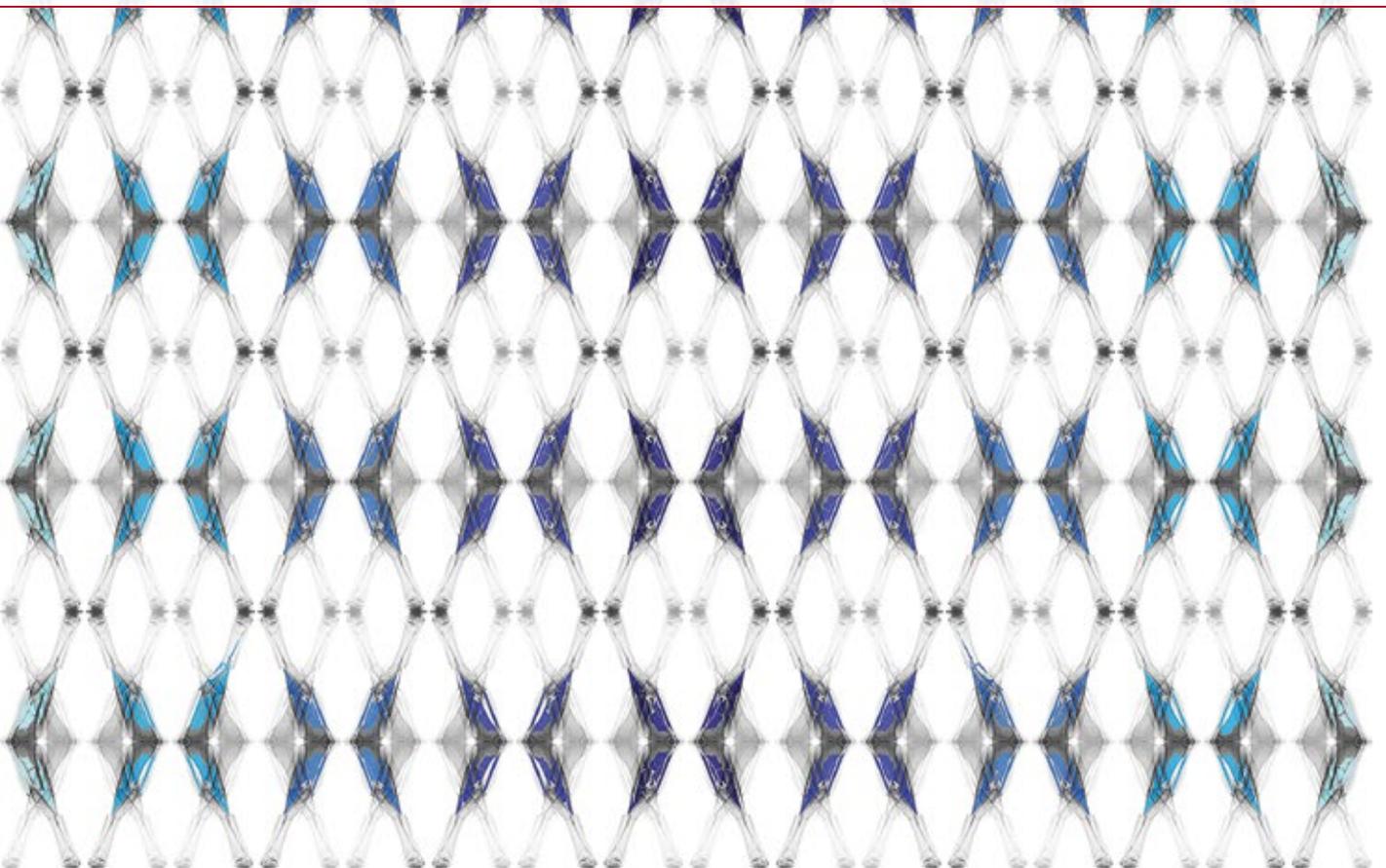


FRAMEWORK

FOR GROWTH

2016 REPORT
DEPARTMENT OF ORTHOPAEDIC SURGERY AND REHABILITATION



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FRAMEWORK

Noun | frame·work | \ˈfrām-ˌwɜrk\

**AN ESSENTIAL SUPPORTING STRUCTURE OF A BUILDING, VEHICLE OR OBJECT
A BASIC STRUCTURE UNDERLYING A SYSTEM, CONCEPT OR TEXT**

The University of Nebraska Medical Center's Department of Orthopaedic Surgery and Rehabilitation is growing. From the size of our award-winning department, to the scope of our reach in the orthopaedic world and the new space we call home, we continue to build upon a solid foundation of exceptional patient care, cutting-edge research and innovative education. This is our framework for growth, and we're leading the way one breakthrough at a time.

MISSION

FOR GROWTH



The Department of Orthopaedic Surgery and Rehabilitation has always strived to be a local and national leader in orthopaedic care. Above all, our mission is to advance the future of orthopaedic medicine by providing state-of-the-art patient care, innovative education and cutting-edge research.

In academic medicine we often speak of our mission as a “three-legged stool,” where each leg stands for a different aspect of our service and provides the basic framework of our practice. Each leg is vital for the success of not only the academic mission, but also the other two legs.

Only by successfully integrating each of the three legs can we give patients the best possible care, educate the next generation of orthopaedic surgeons and develop top-notch procedures and techniques for the future.

PATIENT CARE

We specialize in the prevention, diagnosis and treatment of musculoskeletal disorders in children, adolescents and adults. Our service provides quality, cost-effective care in each of the orthopaedic subspecialties: adult reconstructive surgery, hand and upper extremity surgery, shoulder and elbow surgery, orthopaedic oncology, orthopaedic traumatology, spine surgery, sports medicine and pediatric orthopaedics.

RESEARCH

Through clinical outcomes studies and collaborative projects, our surgeons conduct world-class research in the areas of musculoskeletal diseases, molecular biology and genetics. At our Biomechanics and Advanced Surgical Technologies Laboratory, research faculty are dedicated to the development of less invasive surgical techniques, knee implant simulation and computer-aided robotic surgery.

EDUCATION

Our residency training program is a competitive, challenging program that equips residents with the very best tools and training. By investing in education we are not only creating tomorrow's top orthopaedic surgeons, but also cultivating promising educators who will teach for generations to come. Over the course of five years, our residents train in all nine orthopaedic specialties with rotations at Nebraska Medicine and other practices throughout the Omaha community.

MESSAGE

FROM THE CHAIR

The Department of Orthopaedic Surgery and Rehabilitation at the University of Nebraska Medical Center has long been dedicated to our mission of improving the quality of orthopaedic care throughout Nebraska and beyond. The members of our department are committed to finding new ways of developing more advanced patient care, important breakthroughs in research and superior education of the next generation of orthopaedic surgeons. As part of this commitment, we are pleased to present our sixth biennial year-end report, *Framework for Growth*.

Each year I find myself impressed and inspired by the work of our faculty, residents and staff in the Department of Orthopaedic Surgery and Rehabilitation. As expected, the last two years have been no different. When I look back on these pivotal years in our department's history, I see a time characterized by tremendous growth and fellowship – both of which are essential components to our mission.

Over the past two years, we've watched as our new facility has, quite literally, been built from the ground up. It is incredible to see the Lauritzen Outpatient Center and Fritch Surgery Center move from a design on paper to a brick-and-mortar structure. By the time this report is published, we will have successfully moved our academic department, outpatient clinic and Orthopaedics Biomechanics and Advanced Surgical Technologies Laboratory into our new, state-of-the-art facility at 40th and Leavenworth. This move would not have been possible without a generous donation from Ruth and Bill Scott, longtime supporters of UNMC and the Department of Orthopaedic Surgery and Rehabilitation.

To match our facility expansion, it only makes sense to grow our department personnel. We kicked off that initiative in 2015, when we were

approved for an additional orthopaedic resident each year, eventually bringing our total complement to 25 residents. We have been fortunate to welcome three new surgeons to our clinical faculty within just the last two years: pediatric orthopaedic surgeon Maegen J. Wallace, M.D.; and hand, upper extremity and microvascular surgeons Joseph A. Morgan, M.D., and David A. Rhodes, M.D. Dr. Wallace is an excellent addition to our world-class pediatric orthopaedic team, and the appointments of Dr. Morgan and Dr. Rhodes have enabled us to expand our hand and upper extremity service. Dr. Rhodes is also excited to develop a new service to treat pediatric and congenital hand deformities at our pediatric hospital partner, Children's Hospital & Medical Center.

As you'll see in the pages of this report, our faculty members have made unprecedented strides in furthering the field of orthopaedics through research, fellowship and collaboration. Since our previous edition of this report, our faculty members have produced more than 45 peer-reviewed journal articles and book chapters, given a combined 150 presentations at local, regional, national and international conferences and institutions, and are currently involved in almost 40 research studies. It is an honor to have such significant work happening at UNMC.



In particular, the department's Orthopaedics Biomechanics and Advanced Surgical Technologies Laboratory, led by director Hani Haider, Ph.D., is leading the pack in developing testing standards for orthopaedic implants, as well as revolutionary surgical tools that have the power to improve the lives of patients around the world.

Our Nebraska Orthopaedic Residency Training Program continues to yield the brightest young orthopaedic surgeons, many of whom go on to build their careers in the Midwest. We had more than 530 applicants to our orthopaedic residency program in 2015 alone. Our faculty members have always maintained the belief that, first and foremost, residents are here as learners rather than service providers. We uphold this belief by making a commitment to enhance our comprehensive resident education program, including the recent acquisition of a new virtual-reality based simulator, a highly-advanced training tool for residents in arthroscopic surgery.

The University of Nebraska Medical Center has also made a significant investment in using next-generation technology in medical education. UNMC's iEXCEL initiative focuses on engaging learners in real-life scenarios using simulation and virtual reality technology, which enables

them to acquire skills and knowledge before encountering real-life scenarios. This initiative, along with our proximity to Telemedicine services in our new facility, will provide even more value to our orthopaedic residents as they complete their residency training at UNMC.

This biennial report represents the culmination of two years of progress in the Department of Orthopaedic Surgery and Rehabilitation. My hope is that this publication serves as an update to our alumni, peers and friends of the department, who all make our successes possible through their motivation, collaboration and donation.

From all of us in the Department of Orthopaedic Surgery and Rehabilitation, thank you for your continued support.

Kevin L. Garvin, M.D.
**Professor and Chair
Orthopaedic Surgery
and Rehabilitation**



FACULTY

ADULT RECONSTRUCTIVE SURGERY



Curtis W. Hartman, M.D.

Associate Professor

Kevin L. Garvin, M.D.

Professor and Chair

Beau S. Konigsberg, M.D.

Associate Professor

ADULT SPINE SURGERY



Chris A. Cornett, M.D.

Assistant Professor

SHOULDER & ELBOW SURGERY



Philipp N. Streubel, M.D.

Assistant Professor

Matthew J. Teusink, M.D.

Assistant Professor

ORTHOPAEDIC ONCOLOGY



Sean V. McGarry, M.D.

Associate Professor

HAND & UPPER EXTREMITY SURGERY



Philipp N. Streubel, M.D.

Assistant Professor

Joseph A. Morgan, M.D.

Assistant Professor

David A. Rhodes, M.D.

Assistant Professor



ORTHOPAEDIC TRAUMATOLOGY

Miguel S. Daccarett, M.D.

Associate Professor

Matthew A. Mormino, M.D.

Professor

Justin C. Siebler, M.D.

Associate Professor

PEDIATRIC ORTHOPAEDIC SURGERY



Maegen J. Wallace, M.D.

Assistant Professor

Kody Moffatt, M.D.

Adjunct Professor

M. Layne Jenson, M.D.

Assistant Professor

Brian P. Hasley, M.D.

Associate Professor

Paul W. Esposito, M.D.

Professor

Susan A. Scherl, M.D.

Professor

SPORTS MEDICINE



Miguel S. Daccarett, M.D.

Associate Professor

Mark E. Dietrich, M.D.

Assistant Professor

RESEARCH



Hani Haider, Ph.D.

Professor

Director, Orthopaedics
Biomechanics and
Advanced Surgical
Technologies Laboratory

CLINICAL FACULTY

ADULT RECONSTRUCTIVE SURGERY

The department's adult reconstruction surgeons specialize in inflammatory, degenerative and post-traumatic joint problems; bone and soft tissue reconstruction; and prosthetic joint replacement. Our surgeons perform more than a thousand total knee and total hip arthroplasties every year, taking great measures to improve patients' outcomes.

Through important clinical research, we also play a role in the advancement of joint arthroplasties, corrective osteotomies, implants, biomaterials, and bone, cartilage and soft tissue treatment. Our practice is able to take advantage of translational biomechanics research and industry-leading testing of knee replacement implants.

KEVIN L. GARVIN, M.D.

Dr. Garvin has special interests in hip and knee reconstruction, and the prevention and treatment of musculoskeletal infections. He has maintained an active clinical practice, performing over 400 primary hip and knee arthroplasties and periacetabular or femoral osteotomies per year. He has extensive experience performing all hip approaches (anterior, anterolateral, transtrochanteric and posterior). He is also an active research, having published 130 peer-reviewed scientific articles and book chapters.

CURTIS W. HARTMAN, M.D.

Dr. Hartman specializes in comprehensive care for adult patients with hip and knee arthritis. His other interests include revision of failed hip and knee replacements, as well as management of infected hip and knee replacements.

BEAU S. KONIGSBERG, M.D.

Dr. Konigsberg specializes in comprehensive care for adult patients with hip and knee arthritis. His focus is on primary and complex hip and knee replacement and revision surgeries.

ADULT SPINE SURGERY

The department's spine surgeons understand how debilitating back and neck pain can be. We provide comprehensive evaluation, treatment and management for a wide range of routine and complex conditions, involving all cervical, thoracic, lumbar and sacral aspects of the spine, and including deformities, injuries and deterioration. We specialize in arthritis, spinal stenosis, tumors, trauma and other specialized treatments in adults; as well as various conditions that impact children, including scoliosis, hip dysplasia, sports injuries, limb deformity and trauma.

CHRIS A. CORNETT, M.D.

Dr. Cornett's clinical expertise is in all aspects of adult spine surgery (cervical, thoracic, and lumbar). In his spine-only practice, Dr. Cornett treats a variety of conditions including degenerative conditions/ arthritis, spinal stenosis, myelopathy, spondylolisthesis, disc herniations, instability, scoliosis, tumors and trauma.

SHOULDER & ELBOW SURGERY

The department provides comprehensive evaluation and management for a wide range of shoulder and elbow disorders, including arthritis, dislocation or instability, fractures, rotator cuff and tendon tears, joint stiffness and complications due to previously unsuccessful surgeries. We use a multidisciplinary team approach to consider non-surgical and surgical treatment plans, ranging from exercises to full reconstructive operations, with a goal to maximize joint function.

PHILIPP N. STREUBEL, M.D.

Dr. Streubel specializes in comprehensive care of the upper extremity. His clinical interest focuses on degenerative conditions and traumatic and overuse injuries of the shoulder, elbow, wrist and hand. His research interests include shoulder arthroplasty and the treatment of elbow stiffness and instability, as well as management of thumb arthritis, wrist fractures and trauma of the proximal and distal humerus.

MATTHEW J. TEUSINK, M.D.

Dr. Teusink's special interests are in shoulder and elbow arthroplasty, trauma, and arthroscopy.

ORTHOPAEDIC TRAUMATOLOGY

The department's trauma team specializes in evaluation, treatment and long-term follow-up of fractures, dislocations and other musculoskeletal injuries, ranging from common to complex. We use internal, intramedullary and external fixation techniques, as well as microvascular techniques for the repair of fractured joints and damaged soft tissues.

Nebraska Medicine offers a Level 1 trauma center that provides 24/7 trauma coverage for Omaha and the surrounding areas. We are proud to be the only state-designated Comprehensive Trauma Center in Nebraska serving both children and adults. Patients with polytrauma, long bone and/or pelvic trauma benefit from a comprehensive array of emergency services, diagnostic imaging and medical and surgical consultation. Our outpatient clinic is also available for long-term follow-up.

MATTHEW A. MORMINO, M.D.

Dr. Mormino's special concentrations include pelvic fractures, malunions and nonunions, foot and ankle trauma, and periarticular fractures.

MIGUEL S. DACCARETT, M.D.

Dr. Daccarett's special interests include pelvic and acetabular fractures, fractures around the joints and sports related injuries of the knee, including multi ligamentous injuries, ACL, PCL and meniscal tears. He also specializes in cartilage repair procedures, lower extremity osteotomies and patella realignment.

JUSTIN C. SIEBLER, M.D.

Dr. Siebler's clinical expertise is in orthopaedic fractures, injury and trauma. He specializes in fractures in and around joints (periarticular fractures), fractures of the pelvis and hip socket, and fragility fractures.

CLINICAL FACULTY

PEDIATRIC ORTHOPAEDIC SURGERY

The department's specialty-trained pediatric surgeons are dedicated to the care of all musculoskeletal problems in infants, children and adolescents at Nebraska Medicine and our pediatric partner, Children's Hospital & Medical Center. As the largest and most comprehensive pediatric orthopaedics team in the region, our physicians are fellowship-trained in both congenital and acquired orthopaedic conditions, many of which are unique to children.

We treat limb and spine deformities, including clubfoot, scoliosis and hip dislocations. We also treat patients for gait abnormalities, bone and joint infections and fractures and dislocations of the arms, legs and spine. Children with spina bifida, cerebral palsy, muscular dystrophy, osteogenesis imperfecta and other congenital and developmental problems receive coordinated care in pediatric orthopaedics with the highest level of surgical and non-surgical treatments.

PAUL W. ESPOSITO, M.D.

Dr. Esposito's special interests are in children's extremity deformities, osteogenesis imperfecta, congenital and developmental disorders, cerebral palsy, and musculoskeletal effects of pediatric obesity.

SUSAN A. SCHERL, M.D.

Dr. Scherl's areas of focus are pediatric orthopaedic trauma and management of orthopaedic aspects of cerebral palsy.

BRIAN P. HASLEY, M.D.

Dr. Hasley's areas of focus are pediatric orthopaedic and pediatric spine surgery.

M. LAYNE JENSON, M.D.

Dr. Jenson's areas of focus include scoliosis, hip dysplasia, pediatric and adolescent sports injuries, limb deformity and trauma.

MAEGEN J. WALLACE, M.D.

Dr. Wallace specializes in the care of pediatric orthopaedic conditions. She focuses on lower extremity conditions, including the foot, knee and hip.

SPORTS MEDICINE

The department provides comprehensive evaluation and management for a wide range of shoulder and elbow disorders, including arthritis, dislocation or instability, fractures, rotator cuff and tendon tears, joint stiffness and complications due to previously unsuccessful surgeries. We use a multidisciplinary team approach to consider non-surgical and surgical treatment plans, ranging from exercises to full reconstructive operations, with a goal to maximize joint function.

MIGUEL S. DACCARETT, M.D.

Dr. Daccarett's special interests include pelvic and acetabular fractures, fractures around the joints and sports related injuries of the knee, including multi ligamentous injuries, ACL, PCL and meniscal tears. He also specializes in cartilage repair procedures, lower extremity osteotomies and patella realignment.

MARK E. DIETRICH, M.D.

Dr. Dietrich's specialty interests include sports-related injuries, arthroscopic knee and shoulder reconstruction, as well as a special interest in hip arthroscopy.

HAND & UPPER EXTREMITY SURGERY

The department's hand and upper extremity service has grown three-fold in past year, in response to high clinic and patient volumes. Our dedicated hand, upper extremity and microvascular surgeons have specialized training in the treatment of a full range of degenerative, traumatic and sports-related conditions affecting the hand, wrist, forearm, elbow and shoulder. These conditions include carpal and cubital tunnel syndrome, trigger finger, tennis elbow, fractures, arthritis and tendon and nerve injuries.

Patients are treated with alternatives ranging from non-operative modalities to state-of-the-art surgical interventions. Treatments range from arthroscopy over nerve release, joint replacement, fracture fixation and ligament and tendon repair or reconstruction.

JOSEPH A. MORGAN, M.D.

Dr. Morgan specializes in the complete care of the upper extremity from elbow to fingertips. His clinical interests include treatment of nerve injuries and compressive neuropathies, microvascular surgery, degenerative conditions and traumatic injuries to the hand and wrist, and the treatment of musicians' hands. His research interests include outcomes of nerve repair techniques, methods to improve patient and physician education, and upper extremity conditions in musicians.

DAVID A. RHODES, M.D.

Dr. Rhodes has expertise in treating routine and complex adult problems such as arthritic joints, compressive neuropathies and traumatic injuries of the hand, wrist and elbow. In addition, his clinical and research interests are focused on pediatric hand and upper limb problems including congenital hand differences, brachial plexus palsy, arthrogyrosis, tetraplegia, traumatic injuries and sports medicine.

PHILIPP N. STREUBEL, M.D.

Dr. Streubel specializes in comprehensive care of the upper extremity. His clinical interest focuses on degenerative conditions and traumatic and overuse injuries of the shoulder, elbow, wrist and hand. His research interests include shoulder arthroplasty and the treatment of elbow stiffness and instability, as well as management of thumb arthritis, wrist fractures and trauma of the proximal and distal humerus.

ORTHOPAEDIC ONCOLOGY

UNMC's orthopaedic oncology team consists of a highly-skilled interdisciplinary team of surgeons, radiologists, pathologists, medical and radiation oncologists and allied health professionals. They treat patients for a variety of benign and malignant bone and soft tissue tumors and tumor-like conditions in all areas of the axial and appendicular skeleton. We emphasize a modern approach to surgical preservation of skeletal function, often with bone graft and custom prosthetic implants.

SEAN V. MCGARRY, M.D.

Dr. McGarry specializes in orthopaedic oncology with a focus on limb salvage.

NEW FACULTY



MAEGEN J. WALLACE, M.D.

Pediatric Orthopaedic Surgery

Maegen J. Wallace, M.D., joined the Department of Orthopaedic Surgery and Rehabilitation as an assistant professor in September 2015. She specializes in pediatric orthopaedic surgery, and focuses her practice on lower extremity orthopaedic conditions in children, including the foot, knee and hip.

A Lincoln native, Dr. Wallace graduated from Missouri State University with a bachelor's degree in sports medicine and athletic training. She then returned to Nebraska to pursue her medical degree at the University of Nebraska Medical Center (2004-2008). She completed her orthopaedic surgery residency at Saint Louis University in St. Louis, MO (2008-2014), followed by a one-year pediatric orthopaedic surgery fellowship at the DuPont Hospital for Children in Wilmington, DE (2014-2015).

Dr. Wallace is a member of the American Academy of Orthopaedic Surgeons, a member of the American Orthopaedic Association's Emerging Leaders Program and a candidate member of the Pediatric Orthopaedic Society of North America.

Refereed Articles:

Atanda, A., **Wallace, M.**, Bober, M., Mackenzie, W.: (2016). Arthroscopic Treatment of Discoid Lateral Meniscus Tears in Children With Achondroplasia. *J Pediatr Orthop*, 36(5), e55-e58.

Wallace, M., Kruse, R., Eutsler, E., Averill, L.: (2016). MRI findings of post-traumatic subperiosteal hematoma of the iliac bone with resultant femoral nerve palsy in an adolescent boy. *Pediatr Radiol*, 1-4.

Honors, Awards and Offices Held:

Volunteer Physician, Perry Outreach Program: Women in Orthopaedics, UNMC/The Perry Initiative, Omaha, NE, 2015-2016

Children's Hospital & Medical Center

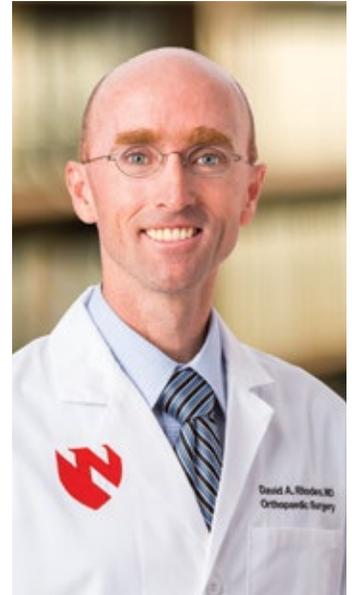
- Credentials Committee, Jan. 2016-present
- Medical/Surgical Interdisciplinary Committee, Sept. 2015-present

Pediatric Orthopaedic Society of North America

- Candidate Member, 2015-present
- Residents Review Newsletter Publication Committee, 2015-present

Emerging Leaders Program, American Orthopaedic Association, 2013-present

DAVID A. RHODES, M.D.



Hand, Upper Extremity and Microvascular Surgery

David A. Rhodes, M.D., joined the Department of Orthopaedic Surgery and Rehabilitation as an assistant professor in November 2016. He is fellowship-trained in hand, upper extremity and microvascular surgery.

Dr. Rhodes earned his medical degree from UNMC in 2006. He completed his orthopaedic surgery residency at the University of Utah Hospitals and Clinics in 2011 and went on to complete an upper extremity reconstruction and sports medicine fellowship at the University of Manitoba in 2012.

He practiced general orthopaedic surgery in Kansas for three years before pursuing a hand, microsurgery and upper extremity fellowship at the University of Arizona-Phoenix, which was completed in 2016. He then went on to pursue further sub-specialty education by completing an additional fellowship in pediatric hand and upper extremity surgery at the Shriners Hospital for Children-Philadelphia.

Dr. Rhodes has expertise in treating routine and complex adult problems such as arthritic joints, compressive neuropathies and traumatic injuries of the hand, wrist and elbow. In addition, his clinical and research interests are focused on pediatric hand and upper limb problems including congenital hand differences, brachial plexus palsy, arthrogryposis, tetraplegia, traumatic injuries and sports medicine.

JOSEPH A MORGAN, M.D.



Hand, Upper Extremity and Microvascular Surgery

Joseph A. Morgan, M.D., joined the Department of Orthopaedic Surgery and Rehabilitation as an assistant professor in August 2016. He specializes in hand, upper extremity and microvascular surgery.

Dr. Morgan grew up in Auburn, Indiana, and attended medical school at the Indiana University School of Medicine (2005-2010), followed by a year-long sports medicine research fellowship at the Mayo Clinic Department of Orthopaedic Surgery in Rochester, Minnesota (2009-2010). He then completed an orthopaedic surgery residency at the University of Missouri Hospital and Clinics in Columbia, Missouri (2010-2015), immediately followed by a hand surgery fellowship at Rush University Medical Center in Chicago (2015-2016).

Dr. Morgan specializes in the complete care of the upper extremity from elbow to fingertips. His clinical interests include treatment of nerve injuries and compressive neuropathies, microvascular surgery, degenerative conditions and traumatic injuries to the hand and wrist, and the treatment of musicians' hands. Dr. Morgan's many research interests include outcomes of nerve repair techniques, methods to improve patient and physician education, and upper extremity conditions in musicians.

He is a member of the American Academy of Orthopaedic Surgeons, and has published over 15 peer-reviewed journal articles.



Site excavation alone took one month and crews moved over **65,000 CUBIC YARDS OF DIRT**—that's enough dirt to fill 20 football fields to a depth of one foot

The building required more than **4.5 MILES OF AUGERCAST PILING**, 189 miles of reinforcing steel and **2.3 MILLION GALLONS OF CONCRETE** to support the building's foundation

OVER 95 PERCENT OF THE CONTRACTORS ON THIS PROJECT ARE MEMBERS OF THE OMAHA COMMUNITY

MOVING ON UP

Over the past two years, members of the Department of Orthopaedic Surgery and Rehabilitation have watched as the site of the new Lauritzen Outpatient Center and Fritch Surgery Center (LOC) has transformed from a pile of dirt into a fully constructed, four-story building. Towering over the intersection of 40th and Leavenworth streets, the building was a large and complex project that required multiple crews to work simultaneously in order to meet the estimated completion date of fall 2016. The department officially moved into our new space in November 2016.

The \$70.8 million building is an unprecedented project for the UNMC and Nebraska Medicine community. Not only was it completed on an accelerated timeline – what historically would take three years to build, crews managed to create with two years – it has also raised the bar for outpatient care.

The LOC boasts almost 170,000 square feet of surgical, research and educational space. In addition to our Orthopaedic clinic, it also houses the Ear, Nose & Throat, General Surgery, Oral Maxillofacial, Oral Facial Plastics, Plastic Surgery and Urology clinics. The Orthopaedic clinic space is equipped with 28 state-of-the-art exam rooms shared with Physical and Occupational Therapy services; each room provides easy access to Radiology and Pharmacy services.

“Input from various members of the orthopaedic clinical team helped shape the layout and design of the clinic space to improve work flow and ease of use,” said Kevin Garvin, M.D. “This center was designed with the patients in mind, and is focused completely on providing them a better experience, from the moment they park their car right outside, to the moment they go home from their appointment or procedure.”

For example, each exam room is estimate to be about 20 percent larger than the rooms previously used. The building also has 10 outpatient operating rooms, a central check-in location and an underground parking garage for patients.

Thanks to a generous gift from longtime supporters Bill and Ruth Scott, the building’s fourth floor is dedicated to orthopaedics. In addition to new office and work space for department faculty, residents, academic support and research staff, the space includes the Orthopaedics Biomechanics and Advanced Surgical Technologies Laboratory, three conference rooms, an auditorium able to accommodate more than 75 people and dedicated space for resident education and research. The fourth floor also includes a new center for telemedicine services.

“This move marks the first time in many years that our clinic, academic offices and research labs will be housed in one location,” Dr. Garvin said. “It creates the optimal environment for us to truly live up to our tripartite mission of patient care, education and research.”

This type of outpatient environment promotes constant collaboration among physicians, facilities, management and staff. The building provides an ideal setting for patients to access the many services previously spread throughout our sprawling campus. By creating one place for outpatient services, we are delivering on our promise of “Serious Medicine, Extraordinary Care.”

The LOC was made possible by a number of generous donors, including the families of Bruce Lauritzen, chairman of First National Bank and a major supporter of the Omaha community; and Charles Fritch, M.D., a UNMC graduate and world-renowned ophthalmologist.

“THIS MOVE MARKS THE FIRST TIME IN MANY YEARS THAT OUR CLINIC, ACADEMIC OFFICES AND RESEARCH LABS WILL BE HOUSED IN ONE LOCATION. IT CREATES THE OPTIMAL ENVIRONMENT FOR US TO TRULY LIVE UP TO OUR TRIPARTITE MISSION OF PATIENT CARE, EDUCATION AND RESEARCH.”

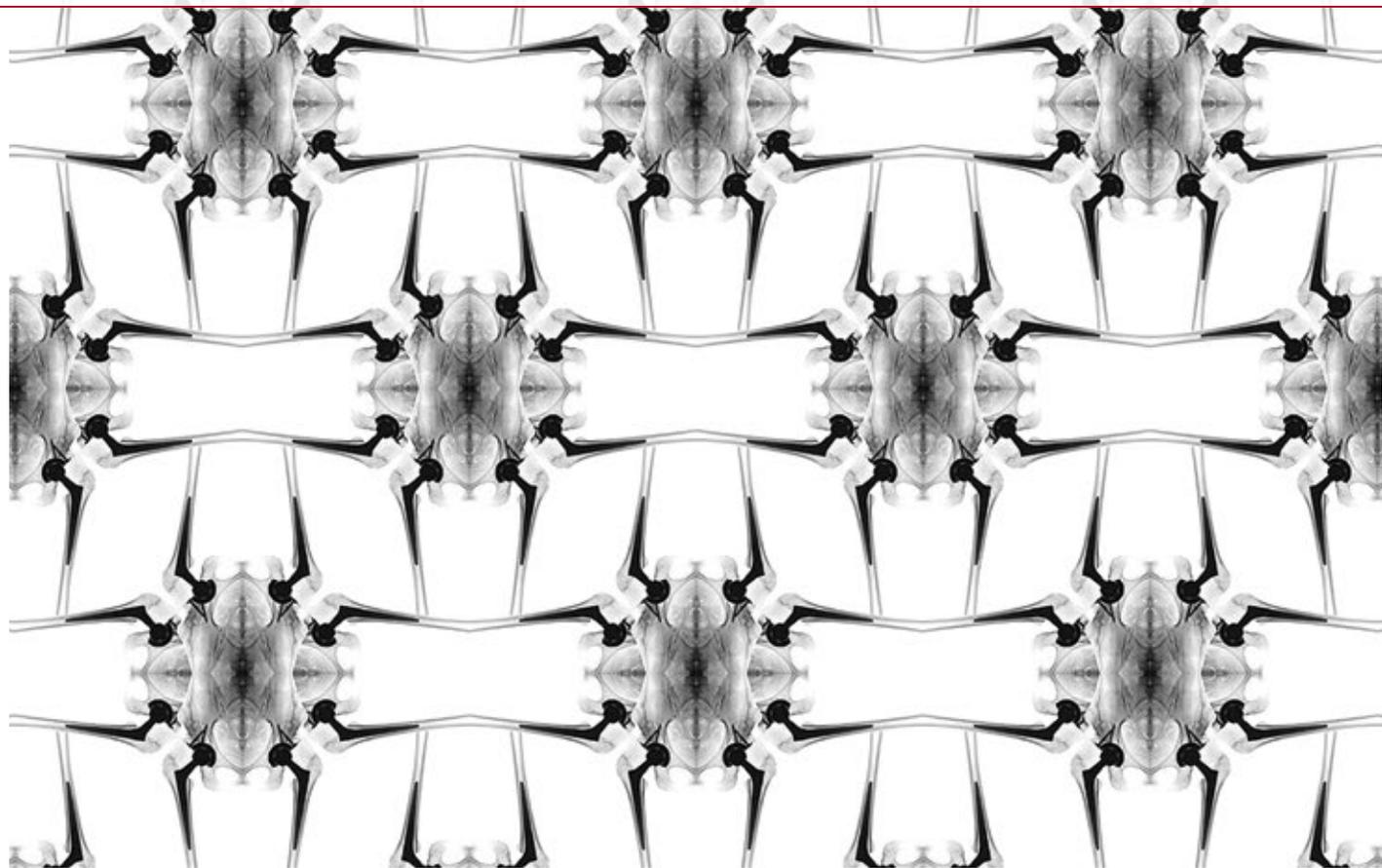
Kevin L. Garvin, M.D.

ORTHOPAEDIC SPECIALTIES

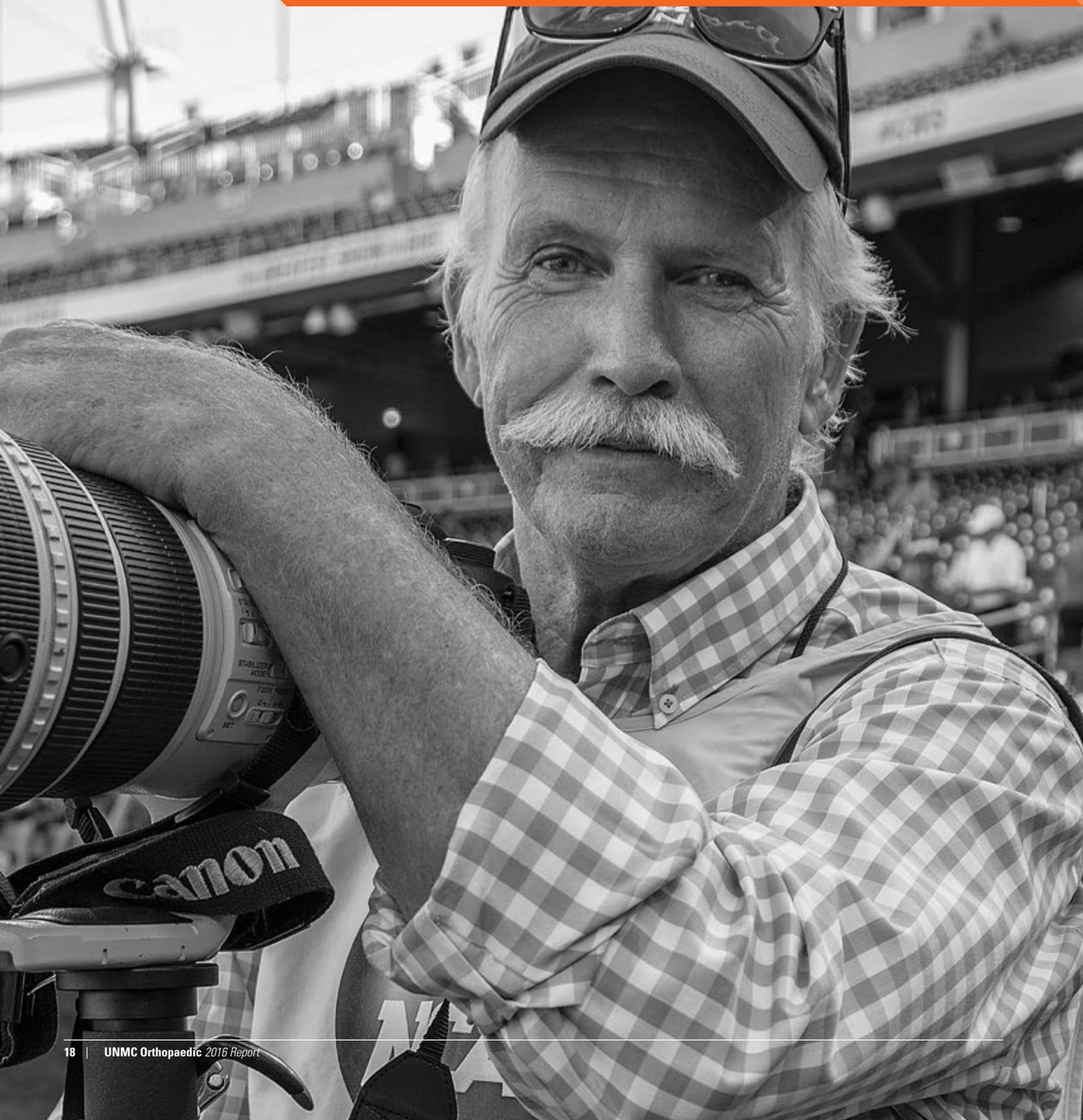
This report is not only about the work we do, but why we do it. Each of our orthopaedic surgeons dedicates his or her career to one or two niche areas of orthopaedic medicine, which means our patients receive top-notch care from specialized experts. There is no better way to communicate the impact of each orthopaedic service than through the stories of our patients themselves.



ADULT
RECONSTRUCTIVE
SURGERY



FROM LIVING WITH PAIN TO
SIMPLY LIVING



At 64, Bruce Thorson has had more surgeries in his lifetime than many people would have in ten. Needless to say, the photojournalist and avid skier is, unfortunately, quite familiar with a hospital gown.

To fully understand Thorson's story, it's best to start from the beginning. The year was 1971; Thorson had just gotten laid off from his job at a ski resort and had returned home to La Jolla, California. One afternoon, he hopped on his motorcycle and traveled a familiar two-lane country road to a friend's house.

He took a curve going too fast, lost control of the bike and narrowly avoided crashing head-on into a telephone pole. Instead, he clipped the right side of his body on the pole's support cable as his bike tumbled down the side of the road.

The accident severed his right arm and shaved three inches of bone off his right femur (thigh bone). Just 19 at the time, Thorson spent the next three years in and out of the hospital, including a nine-month stint in a full body cast. During that time Thorson underwent more than 15 surgeries, his doctors trying desperately to put the pieces of him back together.

"My surgeon said he didn't know why I was alive," Thorson said. "I don't know how many of my nine lives I've used up, but apparently I haven't used them all. Not yet."

Thorson believes his passion for skiing – and his subsequent lower body strength – is what ultimately saved his right leg after the accident. In the years since, however, several untreated ski injuries and general wear and tear on his right knee have come back to haunt him.

About 10 years ago, around the same time he moved to Nebraska to teach photojournalism at the University of Nebraska-Lincoln, Thorson noticed pain in his right knee. He underwent a knee arthroscopy, which held off a replacement for another decade. Then, in early 2014, the pain returned with full force. A normally active person, Thorson found himself unable to even bend his knee to walk up or down a flight of stairs. After five months of continued pain, Thorson knew it was time to see a surgeon.

In June 2014, Thorson underwent a primary total knee arthroplasty (TKA). Three weeks post surgery, however, Thorson's surgical wound had still not healed. Months later, after three debridements and two long-term courses of intravenous antibiotics, the wound still would not heal. Thorson was told that his knee could not take another surgery, and suddenly, he was facing the possibility of persistent pain, intermittent knee drainage and spending the rest of his life on antibiotics to keep the infection suppressed.

"IT'S EXCITING TO BE A PART OF A TEAM THAT WORKS TOGETHER TO HELP PREVENT, DIAGNOSE AND MANAGE PATIENTS LIKE BRUCE WHO HAVE COMPLEX PROBLEMS," DR. GARVIN SAID. "THE SUCCESSFUL TREATMENT OF A PROSTHETIC JOINT INFECTION MEANS ERADICATING THE BACTERIA SO THE PATIENT CAN HAVE A PAIN-FREE, FUNCTIONAL JOINT."

Kevin Garvin, M.D.

**"MY SURGEON SAID HE DIDN'T
KNOW WHY I WAS ALIVE,"
THORSON SAID. "I DON'T KNOW
HOW MANY OF MY NINE LIVES
I'VE USED UP, BUT APPARENTLY
I HAVEN'T USED THEM ALL. NOT YET."**

Bruce Thorson

"That didn't sound right to me," Thorson remembered. Not satisfied with this fate, he met with Kevin Garvin, M.D., at UNMC for a second opinion.

Dr. Garvin identified the problem as a prosthetic joint infection. Fluid was taken from the prosthetic knee, and the culture identified a methicillin-resistant coagulase negative *Staphylococcus* infection. An MRI was performed to evaluate the extent of the infection and it was shown to be contiguous to his femur fracture near his hip joint.

Dr. Garvin's quick diagnosis and decisive action plan put Thorson at ease.

"Within five minutes he had figured it out," Thorson recalls. "So, I switched over to him. At least up until this point in time, I think it was the best move I made."

Due to the delay in the diagnosis of the joint infection, Dr. Garvin knew they were working against the clock. Prosthetic joint infections are relatively rare, occurring in about two percent of patients. When they do occur, however, they are notoriously difficult to manage and often require multiple surgeries and long-term antibiotic courses.

Dr. Garvin completed the first step of a two-stage reimplantation in September 2015. Thorson's surgery was further complicated by a scarred patellar tendon that required an extended tibial tubercle osteotomy before the TKA could be performed. The canal of the femur was full of puss and dead bone from the chronic nature of his infection.





Figure 1: Preoperative AP radiograph.

Figure 2: Preoperative lateral radiograph.

The preoperative AP and lateral x-rays of the right knee show radiolucent lines as evidence of loosening (denoted by arrows). Patella baja is also present with suture anchors (denoted by circles), used to repair the patellar tendon.

The principles of treatment were threefold: Removal of all foreign material (the prosthetic joint), excision of infected and necrotic tissue and placement of a prosthesis laden with high dose antibiotics. The prosthesis acts to maintain the dimensions of the knee joint, improve patient mobility and elute antibiotics at the site of the infection.

Dr. Garvin completed the final replacement surgery in January 2016. In the two years since his first knee replacement surgery, Thorson has undergone six major operations on his knee. "It's been a long haul, but I've been there, done that before," Thorson said.

Thorson spent several months on crutches, gaining more movement and strength each day. Not long after his final surgery, he returned to teaching and resumed photographing athletic events such as Husker basketball games and the College World Series.

"Bruce is certainly driven to get back to full function," Dr. Garvin said. "He doesn't have many limits."

Despite the difficult times and long recovery periods, Thorson believes his motorcycle accident and later leg troubles have made him the person he is today: the person who learned how to ski again after three years in a hospital, became a ski instructor, went to college, earned a degree, became a professional news photographer and then earned tenure at one of the best photojournalism schools in the country. Above all, he's learned not to take anything for granted. "This is the best I've felt in a long time," he said. "I think there is a light at the end of the tunnel."

For Thorson, that light is the possibility of seeing the slopes again next year. While his days of skiing the steep and deep are over, he dreams of being back on a beginner's run soon.

"I just want to strap on the boards and make some turns," he said.

One of the benefits of an academic medical center is the access to collaborative, cutting-edge research. In cases such as Thorson's, this collaborative effort is invaluable.



“It’s exciting to be a part of a team that works together to help prevent, diagnose and manage patients like Bruce who have complex problems,” Dr. Garvin said. “The successful treatment of a prosthetic joint infection means eradicating the bacteria so the patient can have a pain-free, functional joint.”

Dr. Garvin works with researchers at UNMC’s Center for Staphylococcal Research (CSR), which was developed with the goal of further understanding *Staphylococcus* and improving the ability to prevent, diagnose and treat *Staph*-related disease. The Department of Orthopaedic Surgery and Rehabilitation is fortunate to collaborate with investigators from Pathology and Microbiology, Internal Medicine, Pharmaceutical Sciences and Infectious Diseases.

In addition, Tammy Kielian, Ph.D., a professor in UNMC’s Department of Pathology and Microbiology, is currently leading a team of researchers in an effort to collect data to compare immune responses pre- and post-surgery to better understand how the immune system changes under stress and from blood loss during surgery. Dr. Kielian’s team, which includes Dr. Garvin and several other orthopaedic faculty members, is actively pursuing methods for the prevention and treatment of biofilm infections much like Thorson’s.

While there are still many strides to be made, the department has taken preventative measures to reduce the rate of prosthetic joint infection, including identifying nasal carriers of the pathogen and using topical antibiotics or photodisinfection to remove the bacteria. These measures, along with the team approach, have resulted in a low rate of infection among patients. ■



HAND &
UPPER EXTREMITY
SURGERY



IN THE
RIGHT HANDS

Angela Perez is your typical 5-year-old. She loves playing with toys, swimming, dancing and watching cartoons on Disney Channel. She's a fun-loving little girl who likes to play with her many siblings, nieces and nephews any chance she gets, said her father, Jorge.

One March night almost two years ago, what started out as just another playdate took a scary turn. Just three years old at the time, Angela was at home playing with a relative when she took an unlucky tumble. She was carrying a glass of water when she tripped and fell, dropping the glass and landing hard on a broken shard with her left hand. Angela's parents rushed to her aid, and saw that she had a large cut on her hand. At first, they didn't realize exactly how bad it was.

Eventually they called an ambulance, which rushed Angela to the closest hospital, near their hometown of Dakota City. Emergency department staff performed irrigation and debridement to clean the wound but were concerned when they noticed she couldn't move her pinky finger, so she was kept overnight for evaluation.

"The next day the doctor told us he couldn't do anything else for her, but he wanted to make sure the tendons and nerves were OK," Jorge said.

Angela's initial surgeon was worried about the extent of the laceration, particularly that the glass may have caused nerve damage. She was referred to UNMC in Omaha, and the family immediately made the 100-mile trip to see Philipp Streubel, M.D.

Dr. Streubel, a shoulder, elbow and hand surgeon at UNMC, met with Angela and her family to evaluate her injuries. He diagnosed a complex laceration with injuries to multiple nerves and tendons in her hand.

The injury on Angela's hand was quite severe, and she suffered lacerations to the deep and superficial flexor tendons of the index, middle, ring and small fingers. In addition, Dr. Streubel found that Angela's initial surgeon's concern about damaged nerves were valid. She also suffered lacerations to the median nerve, the motor recurrent branch of the median nerve, and the sensory and motor branches of the ulnar nerve. Additionally, the ulnar artery had been transected. Without surgical intervention, Angela's injuries would have left her with a functionless hand.

"This was a very severe injury, in a very small hand," Dr. Streubel said. "Thankfully, Angela's injury was the result of a sharp laceration that made repair fairly straightforward. In addition, her young age and the timeliness of the intervention were on her side for a favorable recovery."

The Perez family, already aware that Angela would most likely need surgery, settled in for a long night. Dr. Streubel took Angela to the operating room almost 72 hours after her initial injury. Her parents stayed close, constantly checking her progress while in the waiting room.

"It's scary," Jorge said. "She's was in there, asleep, and we didn't know what was going on or how long it would take."





Because of the small size of Angela's 3-year-old hand, the six-hour surgery was considered a high-complexity case. Dr. Streubel's ultimate goal of the surgery was to reconnect each tendon strand correctly so that Angela could regain full function of her hand and fingers. In addition, nerve repairs were performed under a surgical microscope.

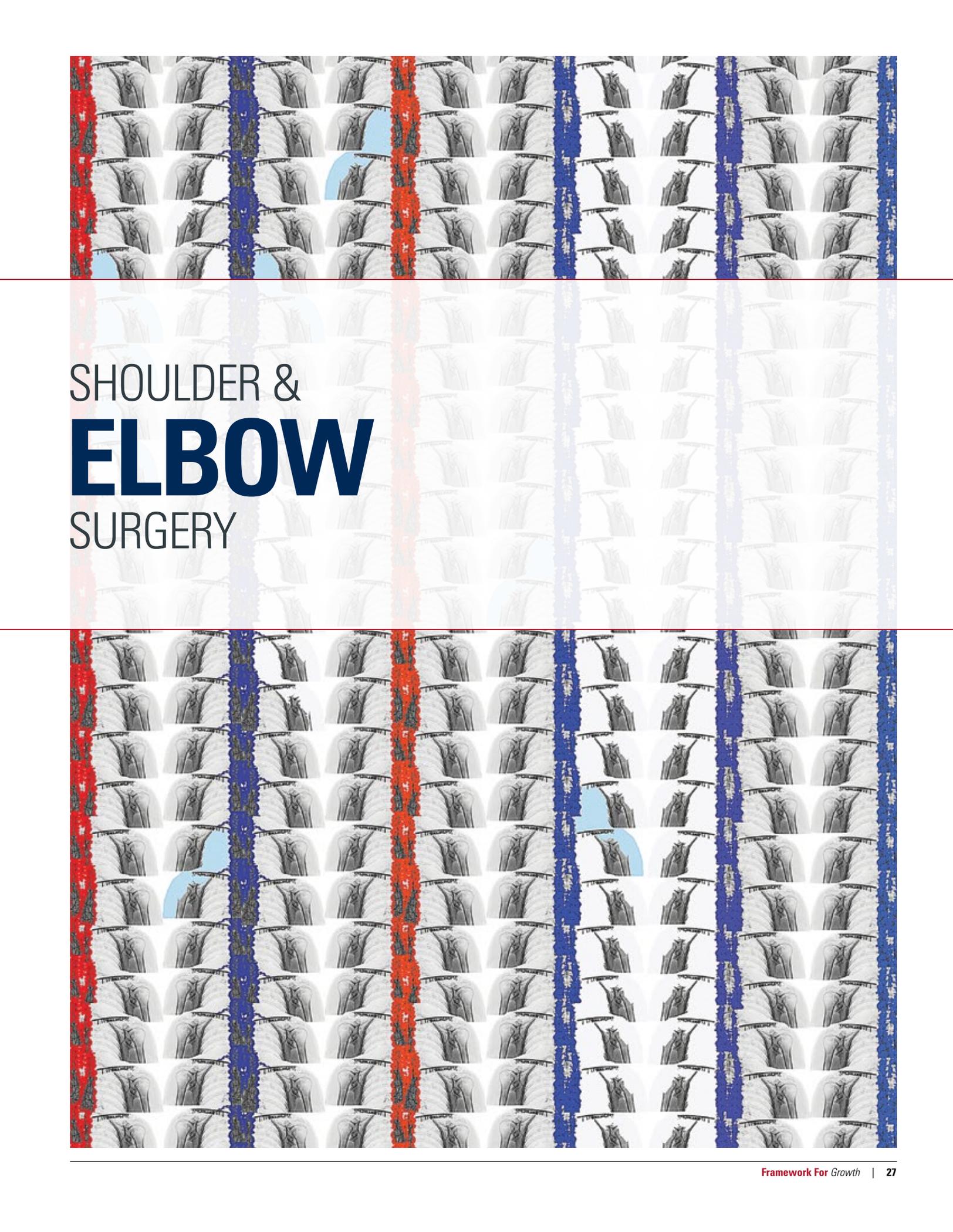
Following the surgery, Angela spent four weeks in a cast to protect against any excessive motion. Under the guidance of Kim Buscher, (OT-CHT) occupational therapist and certified hand therapist at UNMC, Angela began therapy to regain use of all her fingers. About a year after her surgery, Angela and her family returned to Omaha for a follow-up appointment with Dr. Streubel. Remarkably, she had regained full sensation to all of her digits and recovered motor function of both the median and ulnar nerves. Save for a minor loss of flexion of the little finger, Angela's hand was good as new, and she was back to doing the things she loved.

"Angela's recovery has been as good as we could have hoped for," said Dr. Streubel. "Our role as surgeons is to make the correct diagnosis and repair the damage using careful surgical technique. While this takes time and effort to do, the importance of rehabilitation in the hands of our experienced hand therapists cannot be overstated."

These days, the only physical remnants of Angela's accident are a small scar across her palm and a pinky finger that can't quite bend all the way. She can grab and pull with both hands, and her parents even bought her a bicycle to help strengthen her grip, which she learned to ride very quickly. It's a skill that she might never have had the chance to learn without Dr. Streubel's help.

For the Perez family, as well a large number of Spanish-speaking families that seek medical care at UNMC, effective communication between the medical provider and the patient is of utmost importance. This is especially true when discussing complicated medical diagnoses or procedures. Dr. Streubel's bicultural background and his proficiency in Spanish played a big role in ensuring Angela had the optimal care and experience, which undoubtedly contributed to her positive outcome.

"Angela is doing really well, so we're very thankful for Dr. Streubel and his team," Jorge said. "He gave us a lot of confidence about her surgery, and we always felt welcome when we walked into the hospital." ■



SHOULDER &
ELBOW
SURGERY



The simple task of getting dressed used to be downright miserable for Brian Onken. His shoulders caused him so much pain that even raising his arms above his head caused discomfort, loss of grip reflex and shooting pains. An electrician, Onken began to struggle on the job thanks to his ailing shoulders.

Like many construction workers, electricians rely on strong, reliable bones and muscles to perform daily tasks. Onken, 55, spends most days at work standing on a ladder with his arms above his head installing and maintaining electrical wiring or equipment. While he fought through the pain at work, the battle was draining.

Onken had sought relief from his shoulder pain in the past. He started getting corticosteroid injections in 2009. He alternated between the right and left shoulders, and each shot would last about a year before he needed another one.

“Right away, I thought the injections were working great,” Onken said. “Then I slowly started realizing it wasn’t doing me any good.”

After six years of injections in both shoulders, Onken started looking for a more aggressive approach. He found hope in his internal medicine physician, Joel Armitage, M.D., at UNMC. Dr. Armitage referred Onken to a colleague, UNMC shoulder and elbow surgeon Matthew Teusink, M.D.

Onken first met Dr. Teusink in July 2015 and immediately had faith in the surgeon’s ability and treatment plan. “He just came across as someone you can trust and have confidence in,” Onken said.

Upon performing a physical exam and an MRI of the left shoulder, Dr. Teusink identified the cause of the pain to be a rotator cuff tendon tear and thickening and inflammation of the biceps tendon. He noted that while Onken had good range of motion, his pain was still cause for concern.

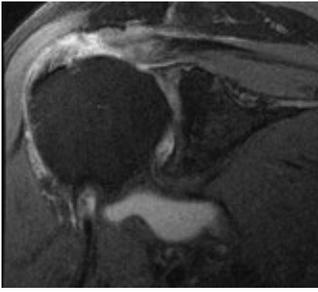
“Most of the time, these patients have pain and shoulder weakness,” Dr. Teusink said. “A rotator cuff tear can make it difficult to sleep at night. In Brian’s case, it was difficult for him to do his job as an electrician.”

In August 2015, Dr. Teusink took Onken to the operating room for a left shoulder arthroscopic rotator cuff repair and a subpectoral biceps tenodesis, where the biceps tendon is detached from the shoulder joint in order to remove the diseased portion of the tendon. The tendon is then reattached to the humerus bone, just below the shoulder. Another physical exam and MRI showed similar findings in his right shoulder and three months later, Dr. Teusink performed the same procedure on Onken’s right shoulder.

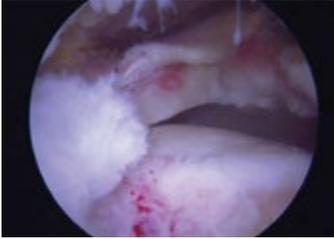
“I PUT ALL OF MY FAITH IN THE FACT THAT MY INTERNAL MEDICINE PHYSICIAN REFERRED ME TO DR. TEUSINK. HE IS JUST VERY NICE AND LAID BACK.”

Brian Onken

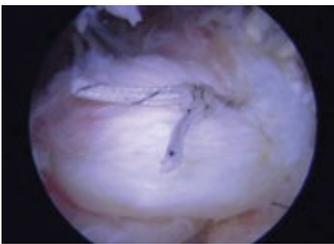
STEPPING BACK INTO **THE CURRENT**



For these procedures, Dr. Teusink opted to use a small all-suture anchor to reattach the biceps tendon because it makes a smaller hole in the bone. In theory, this technique would help reduce the risk of future fractures, which have been reported after using some larger fixation devices. Dr. Teusink is currently part of a study at UNMC investigating biomechanically whether using a suture anchor in this fashion is comparable in strength to using a traditional biotenodesis screw.



Each shoulder takes at least six months to fully heal, Dr. Teusink said. Onken spent the first six weeks after each surgery in a sling with minimal activity. The next 12 weeks were dedicated to regaining motion in the shoulder and strengthening exercises.



"While the surgery reattaches the tendons to the bone in a secure fashion, it still takes the body several months to heal the tendon back to the bone," Dr. Teusink said. "It can sometimes be challenging to convince patients to continue to take it easy when they feel good after a couple of weeks."

Top: MRI image of full thickness rotator cuff tear.

Middle: Arthroscopic image of rotator cuff tear.

Bottom: Arthroscopic image of rotator cuff following arthroscopic repair.

Approximately six months after his first surgery (left shoulder) and three months after the second (right shoulder,) Onken returned to work at Miller Electric Company. Ironically, after several weeks of light-duty work he was assigned to start working at UNMC's new Lauritzen Outpatient Center, the new home of the Department of Orthopaedic Surgery and Rehabilitation.

While Onken has sufficient strength in his shoulders for day-to-day activities, he is continuing with his personal rehab exercises to build back his body strength. His shoulders are still healing, but Onken is happy with the results of his surgeries so far, as well as with the "top shelf" orthopaedic team who performed them. Onken's story is just one example of the benefits of being part of the UNMC and Nebraska Medicine family. From his initial referral, to his final surgery, Onken felt well taken care of.

"I put all of my faith in the fact that my internal medicine physician referred me to Dr. Teusink," he said. "He is just very nice and laid back."

Rotator cuff repairs are Dr. Teusink's most common surgery, and he operates on patients like Onken approximately 100 times annually. As part of an academic medical center, he also dedicates time to teaching orthopaedic residents and conducting research on how to improve these types of shoulder surgeries. Currently, Dr. Teusink is collaborating with fellow researchers at UNMC to develop nanofiber scaffolds to improve healing in rotator cuff repairs by placing stem cells and growth factors at the repair site.

"In spite of our best efforts and techniques, at least 10 percent of rotator cuff repairs do not heal," he said. "Our research is focused on improving the healing environment for rotator cuff repair, so more patients will have successful outcomes like Brian's." ■





ADULT
SPINE
SURGERY



TURNING
THE PAGE

Linda Trout has spent much of her life in a library. She started her career at the McGoogan Library of Medicine at UNMC, and eventually turned her sights to the Omaha Public Library. She spent 30 years working at the South Omaha branch and the Main branch, taking on a variety of roles including marketing, educational programming and community outreach.

In addition to her full work schedule and regular travel with her husband, Trout also dealt with another constant over the years: debilitating back and leg pain.

Trout was first diagnosed with rheumatoid arthritis at just 32 years old. A chronic inflammatory disorder, rheumatoid arthritis affects the lining of a person's joints and causes swelling, bone erosion and joint deformity. She first started noticing symptoms around age 40, and eventually underwent a hip replacement in 2002 at 53 years old. Shortly after the procedure, she fell down a set of stairs and broke her leg, which brought her to Kevin Garvin, M.D., at UNMC for a hip revision surgery in 2003.

Several years later, Trout developed an intense pain in her legs and lower back which left her unable to walk – let alone stand on her feet at work – for any extended amount of time. She searched for ways to find relief, including water therapy, physical therapy, medications and injections. Eventually she sought help, again from Dr. Garvin. He was concerned about a possible spine injury or condition, and referred her to Chris Cornett, M.D., a new surgeon who was slated to join the department several months later. Fresh off a spine surgery fellowship, Dr. Cornett specialized in treating patients with complex spinal conditions.

"I trusted the fact that Dr. Garvin recommended him to me," Trout said. "If Dr. Garvin said he was good, then I knew he must be. And he is excellent."

Trout met Dr. Cornett in 2011 and he quickly diagnosed her with lumbar scoliosis, or curvature in the lower spine, which she never even knew

she had. She had also developed lumbar spinal stenosis (pinched nerves), resulting from her arthritis. While her rheumatologist was able to manage the pain in her hands and other joints, her back would benefit from surgical intervention, Dr. Cornett said. The goal of treatment was threefold: to provide pain relief, reduce her spinal deformity and keep her walking.

Dr. Cornett first operated on Trout in May 2012 and the multi-part procedure took place over two days. First, he performed a lateral interbody fusion, a minimally invasive procedure used to correct the curve of her spine by inserting spacers through a small incision. He was able to correct her curve from 51 degrees to about 10 degrees. The procedure allowed Dr. Cornett to access the intervertebral disc space through her side, rather than from the front or back so as not to disrupt as much soft tissue.

The next day, Trout returned to the operating room and Dr. Cornett performed a multi-level laminectomy and an instrumented fusion with the goal of relieving pressure on her nerves, fusing her L1-L5 vertebrae and inserting rods and screws to provide additional spinal stability.

Trout spent six weeks recovering from the surgery before she could return to work. For the next three years she lived a pain-free life with no restricted range of motion. Unfortunately, Trout returned to Dr. Cornett in 2015, reporting more lower back and leg pain. Despite good alignment in her spine and general well-being for years following her first operation, Trout had developed spondylolisthesis – a condition in which one vertebra slips forward over the bone below it – yet another result of her rheumatoid arthritis.

"THE TRADEOFF WITH THIS SURGERY IS THAT YOU DO LOSE SOME MOTION, BUT IN LINDA'S CASE, WITH HER ARTHRITIS AND HER CURVE, HER BACK DIDN'T MOVE NORMALLY ANYWAY. THE RISK/BENEFIT RATIO WAS IN HER FAVOR."

Chris A. Cornett, M.D.



Top: Preoperative radiograph showing significant lumbar scoliosis and arthritis.

Bottom: Postoperative radiograph demonstrating hardware and curve correction after surgery.

“The first set of surgeries greatly improved Linda’s leg pain,” Dr. Cornett said. “While a fusion would normally last many years, Linda’s rheumatoid arthritis made her more susceptible to additional areas of break down.”

In July 2015, Trout underwent her second major surgery with Dr. Cornett, a laminectomy and a transforaminal lumbar interbody fusion. This procedure fused her down to her pelvis, creating a long, solid piece of bone that doesn’t allow for any movement of the individual vertebrae.

“The tradeoff with this surgery is that you do lose some motion,” Dr. Cornett said. “But in Linda’s case, with her arthritis and her curve, her back didn’t move normally anyway. The risk/benefit ratio was in her favor.”

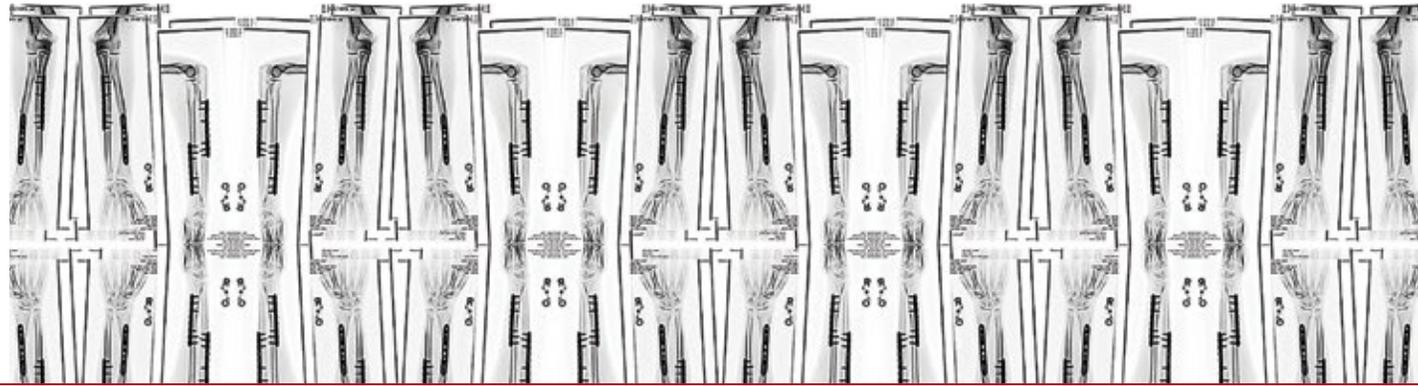
The procedures have made an undeniable impact on Trout’s daily life. Dr. Cornett is hopeful that she will not need any further surgeries on her lower back, but she plans to continue with therapy, intermittent pain management and follow-up appointments about twice a year. Throughout her years-long journey to find pain relief, she

has been grateful to have some of the best surgeons and medical staff doing everything they can to manage her arthritis and keep her walking.

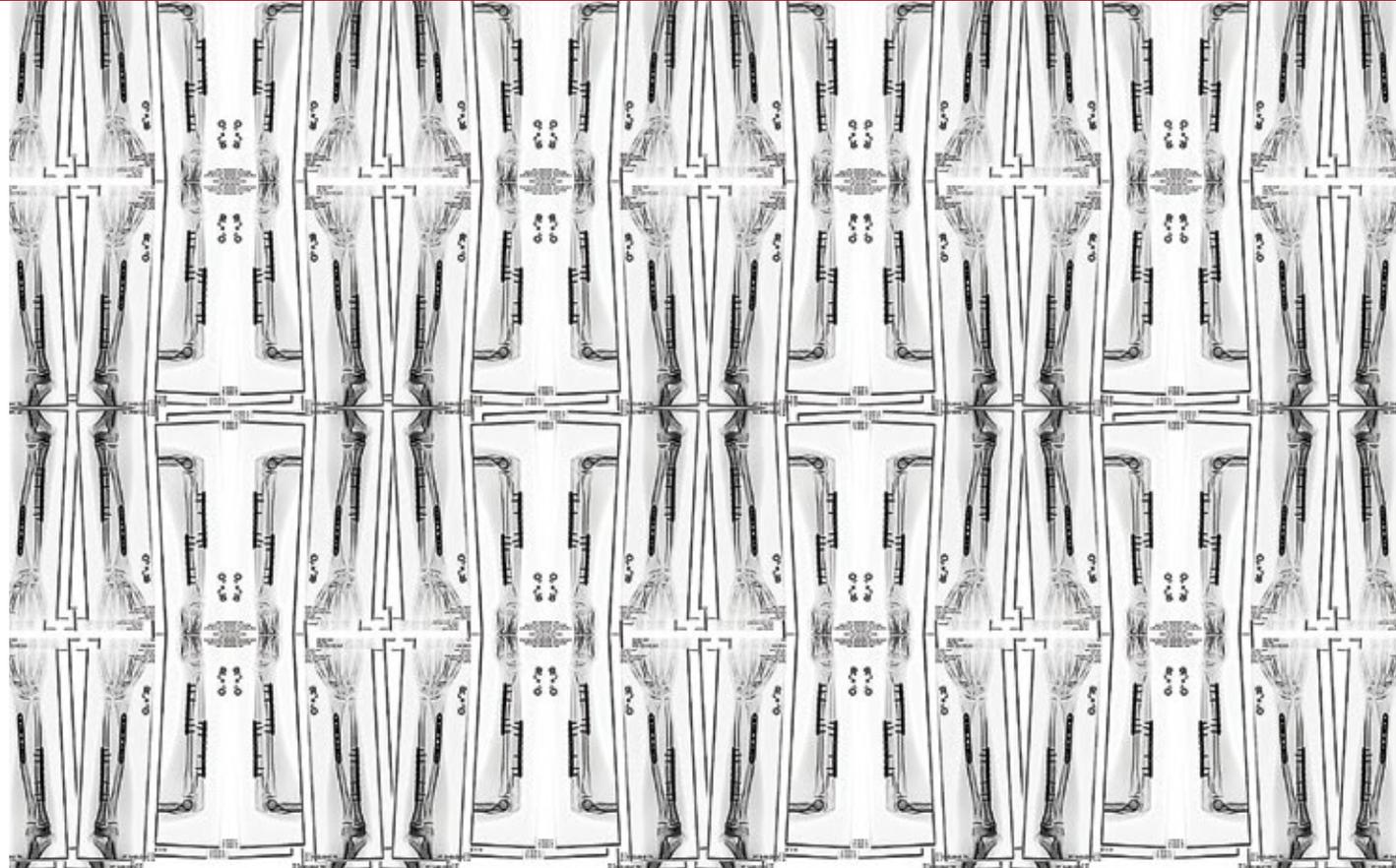
“Dr. Cornett is so kind and has been great to work with,” she said. “He would sit with us, answering any questions we had, going into as much detail as we needed.”

Now retired, Trout enjoys relaxing, spending time with her husband and visiting friends and family. She’s continued her love of reading and traveling, and is grateful to be (mostly) pain free after her operations.

“I still have occasional pain, but not at the level I did six years ago,” Trout said. “The surgeries have made a big difference in allowing me to do the things I want to do.” ■



ORTHOPAEDIC
TRAUMATOLOGY



ONE OF LIFE'S
HARD LESSONS





Tom Yilk has always been mechanically-minded. The 68-year-old Hastings, Nebraska, man went to school for automotive repair and mechanical electronics, worked most of his career as a communication technician for the Nebraska Public Power District and has always had a love of tinkering with cars, motorcycles and anything else he could get his hands on.

Yilk discovered his love for motorcycles when he was 16 years old, and from his first bike to his last, he always did any repairs or maintenance work on his own. In his nearly 50 years of riding a motorcycle, Yilk never had an accident, until a late night working in the garage set him up for disaster.

In mid-October 2015, Yilk was hard at work mounting new tires on his BMW K 1200 LT. He was getting ready to pack it up, putting the wheels back on and torquing them to what he thought was the correct value stated in his maintenance manual. What he didn't notice at the time was the final sentence on the next page of the manual – a crucial piece of information that would have allowed him to finish the job correctly. Instead, he finished up – none the wiser to the error – and called it a night.

The next morning Yilk headed out on what was supposed to be his last ride, a cross-state trip to Chicago to see his son, daughter-in-law and grandchildren. At 67 years old, he felt it was time to slow things down, so he planned to put his bike up for sale upon his return.

"I was ready to give it up," Yilk recalled. "Most of my friends had quit around that same age and I realized that my legs weren't as strong as they used to be."

About 15 miles outside of Hastings on U.S. Highway 6, Yilk felt a strange vibration coming from his bike. He immediately turned the cruise control off, which seemed to settle things. As he turned the cruise back on, he felt his back wheel completely detach itself from the bike. Still doing 65 miles an hour, Yilk held onto the bike for a few more seconds before diving off onto the side of the road as the bike went down.



“ANYTIME WITH THIS INJURY, EVEN WITH THE OPERATION, IT IS UNCOMMON THAT SOMEONE IS ABLE TO RETURN TO THE SAME FUNCTION THAT HE OR SHE HAD BEFORE,” DR. SIEBLER SAID. “WE CAN PUT THINGS BACK TOGETHER, BUT WE CAN’T ALWAYS MAKE IT LIKE IT WAS BEFORE THE INJURY.”

Justin Siebler, M.D.

“The last thing you want to do is get wrapped up in it as it’s going down,” Yilk said of his motorcycle, which is one of the largest luxury touring bikes on the market. “It weighs in at over 1,000 pounds; that’s why you don’t want to stay with it.”

Yilk landed directly on his right shoulder and slid across the rumble strips on the side of the highway. He knew right away that he had done serious damage to his shoulder upon impact, but fought through the pain and remained conscious during the ambulance ride to a nearby Hastings hospital.

His body suit, helmet, gloves, boots and knee pads had spared him from all but a few scrapes, but his bones were a different story. X-rays revealed that Yilk had shattered his scapula (shoulder blade) and clavicle (collarbone), fractured multiple ribs and punctured a lung. Due to the extent of his injuries, Yilk was transferred to UNMC by aircraft and was admitted to the intensive care unit. The trauma team immediately called for an epidural, which was intended to decrease Yilk’s pain and allow him to breathe easier. He remained in the ICU for three more

days before he was stable enough to withstand his next phase of treatment. Meanwhile, Justin Siebler, M.D., chief of orthopaedic trauma surgery at UNMC, reviewed Yilk’s x-rays to evaluate the necessity of surgery.

Scapula fractures are actually quite rare. The shoulder blade is a triangular-shaped bone located beneath a protective layer of muscles, which means that it rarely breaks. When it does, it is an indication the individual has endured an unusually high-energy impact, such as a motorcycle crash. While scapula fractures represent less than 1 percent of all broken bones, even fewer of those are best treated with surgery. Often, a simple sling will do the trick. In Yilk’s case, however, the location and severity of the fracture was cause for concern.

“The shoulder is a ball-and-socket joint,” Dr. Siebler explained. “Tom had fractured the glenoid, or the socket portion of the joint. With any type of fracture in the joint, we are concerned about the shoulder being unstable and we want to try to decrease the risk for post-traumatic arthritis.”



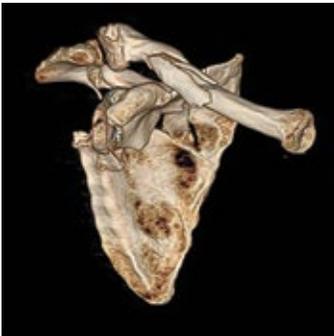
Coupled with Yilk's slightly displaced clavicle, Dr. Siebler decided surgery was the best course of action. He operated four days after Yilk's accident, performing an open reduction internal fixation (ORIF), in which he first repositioned the bones in their normal alignment, and then held them together by attaching metal plates with special screws to the outer surface of the bone. Dr. Siebler estimated that by addressing only the scapula fracture, the clavicle would eventually restore itself. This is one method of treatment when a patient sustains fractures of both the shoulder blade and collarbone.

"At times we operate on one or the other, which is sufficient to stabilize the upper extremity to the body," Dr. Siebler said. "The goal of Tom's surgery was to try and give him a relatively pain free, functioning shoulder. We wanted him to be able to do the things he wants to do."

Dr. Siebler is one of the few surgeons in the region who operates on scapula fractures such as these, so the relative uniqueness makes for an interesting and educational case, especially for residents who may only see such a surgery once or twice a year.

For his part, Yilk doesn't remember much of his stay in the hospital. It was only after his surgery – at a follow-up clinic appointment a month later – that he first remembers meeting Dr. Siebler. However, Dr. Siebler prepared Yilk's family that there was a slim chance he would ever again be able to work with his arm over his head.

"Anytime with this injury, even with the operation, it is uncommon that someone is able to return to the same function that he or she had before," Dr. Siebler said. "We can put things back together, but we can't always make it like it was before the injury."



Top: 3-D CT image demonstrating displaced scapula body and intraarticular glenoid fractures.

Bottom: Six week post-operative AP radiograph.

Yilk was surprised to find that he was encouraged get up and move around shortly after his operation. After just one week in the hospital, he was discharged to a rehabilitation facility, where he worked to regain his range of motion, strength and dexterity.

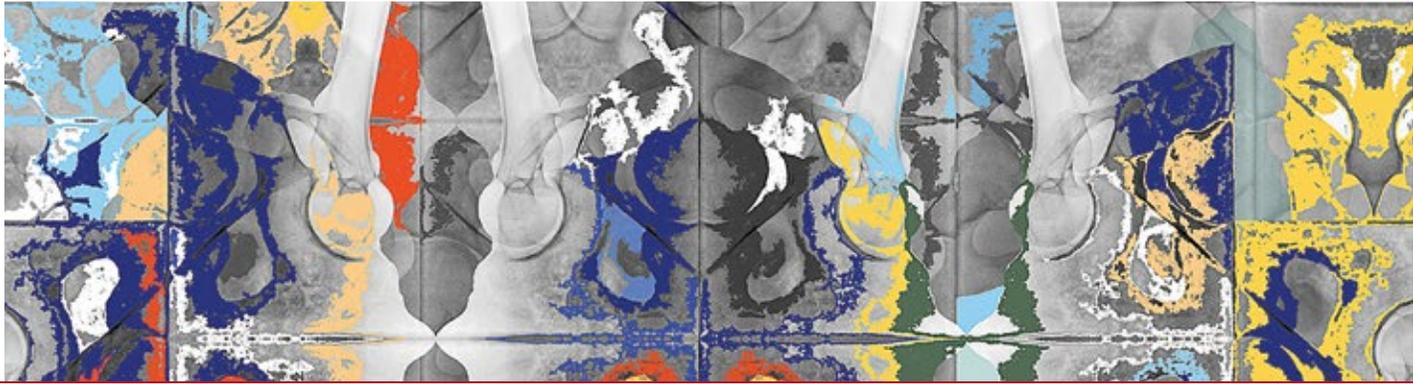
“Not too long ago you would have surgery and you’d be in the hospital for a while, then you would go home and wait for a few weeks, then you would go to rehab,” said Yilk, who is no stranger to a stay in the hospital – he previously had back surgery and received a heart transplant six years ago. “But I think the fact that they stuck me in rehab after one week, and it was very difficult, was one of the things that made me get going faster.”

He spent two weeks in the rehabilitation facility and then returned home, where he continued his rehab regimen.

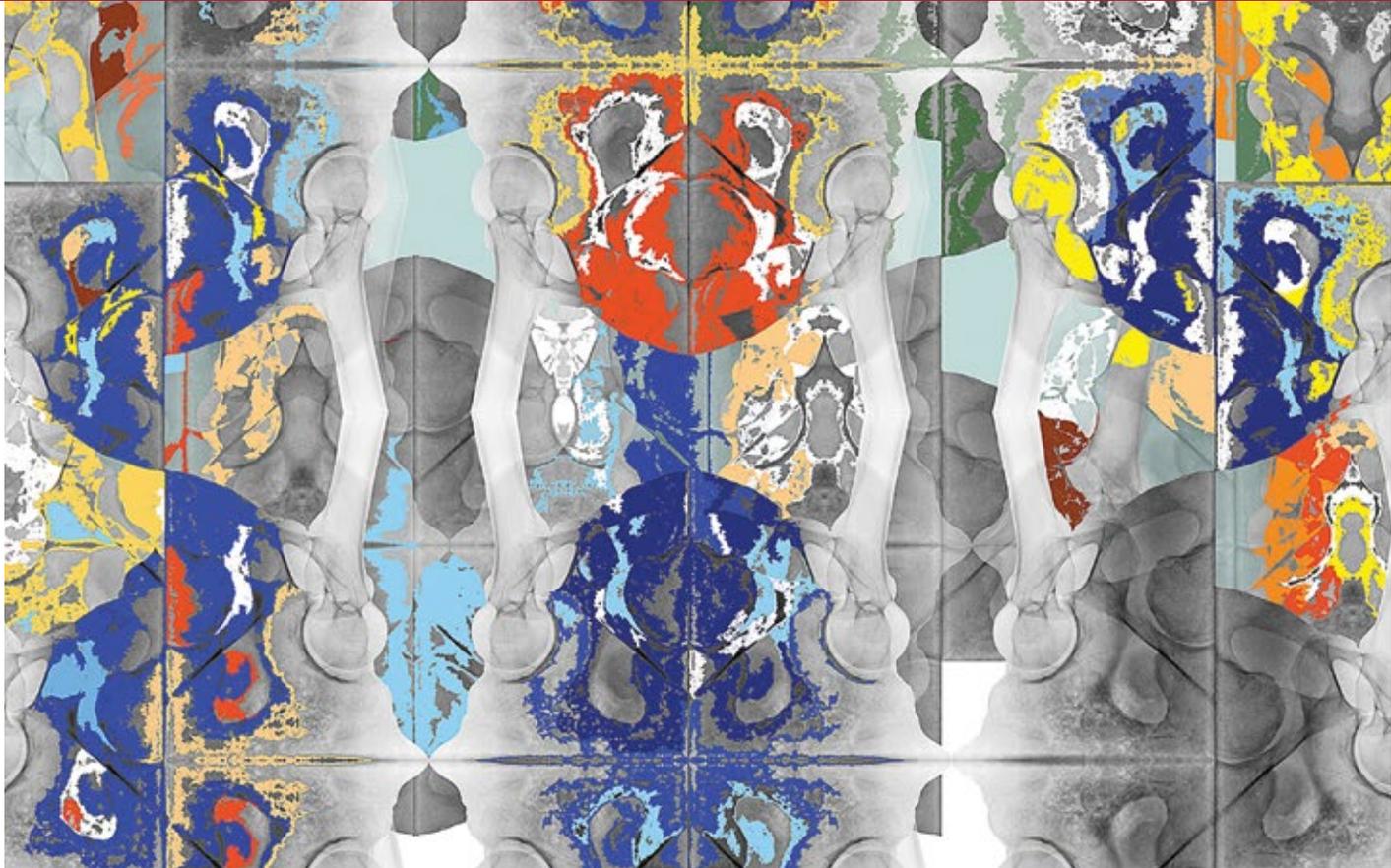
Now more than a year after his accident, Yilk says his shoulder is almost back to 100 percent. He reports no impairment and is able to raise his arms above his head, lift weights and continue to work on his many building projects. Dr. Siebler attributes Yilk’s exceptional outcome to a number of factors, including his medical team choosing the right treatment, his ability to persevere through rehab and his positive outlook.

While Yilk has officially hung up his riding gear, he stays busy traveling with his wife to see family, spending time with his grandchildren and doing various carpentry and mechanical work. Above any of his physical abilities, Yilk believes it was his mental strength that allowed him to get back to nearly full function.

“I look back at it all and it ended up a good outcome,” he said. “Life is full of lessons and it was just one of them. I’ve always been thankful for every breath I got. You look at life a lot different after something like that, you realize you’re the luckiest person around.” ■



PEDIATRIC
ORTHOPAEDIC
SURGERY





A ROCKY START ON A
LONG ROAD

Like many 14-year-olds, Ian Hemmett and his twin brother, Nolan, are always on the go. When they're not playing soccer or baseball, the two boys can usually be found riding their bikes around town, hanging out with friends or playing video games.

Looking at them now, it's hard to believe that there was once a time when doctors – and their parents, Lori and Michael – weren't sure if Ian would ever be able to run, bike or play sports with his brother.

Ian and Nolan were born prematurely at 31 weeks, exactly one minute apart. The twins shared an incubator in the neonatal intensive care unit for the first few days of their lives, but Lori quickly realized something wasn't quite right with Ian. About two weeks into their stay in the NICU, Ian started showing signs of pain in his hip.

"We would lift his legs for a diaper change and he would scream," Lori said. "Because they were premature, they were so skinny. But all of a sudden, Ian's left hip just started swelling up."

After three agonizing days, Lori finally persuaded the NICU staff to do a blood test. The test indicated high levels of infection and a blood culture revealed a methicillin-resistant *Staphylococcus* infection that had settled in Ian's left hip and part of his elbow.

The medical team started Ian on a course of strong IV antibiotics and rushed him into the operating room for emergency surgical drainage of his left hip. The surgery was performed at another facility by a hand surgeon, because he was specialized in operating on small bones. The operation rid Ian of his infection, but signaled the start of a long road ahead for the newborn.



At three months old, an ultrasound showed that although Ian's hip was not dislocated, it was clearly not normal. His surgeon consulted closely with a neonatologist and with Walter Huurman, M.D., a senior pediatric orthopaedic surgeon at Children's Hospital & Medical Center, and a professor of orthopaedic surgery at UNMC at the time. In order to try and set Ian's hip in a secure fashion, his surgical team decided to put Ian in a Pavlik harness, which is commonly used to treat infant hip dysplasia.

Ian spent six months in the harness, and at about seven months of age, Dr. Huurman ordered a CT arthrogram, which confirmed his suspicions. Ian had significant abnormality of the growth of his upper femur, which is typical for a child who had an infection of the bone at such an early age.

"The results were quite worrisome for significant ongoing deformity of the hips which could lead to very early arthritis, as well as several inches of growth difference in the leg length by the time he was done growing," said Paul Esposito, M.D., professor of pediatric orthopaedics at UNMC, and the current clinical service chief of pediatric orthopaedics at Children's Hospital & Medical Center.

Dr. Esposito took over Ian's case upon Dr. Huurman's retirement and has continued to treat and monitor Ian's growth throughout his childhood years. At about two years old, another arthrogram showed that while there was no calcification or ossification in the femoral head on his regular x-rays, he did, remarkably, have a femoral head with a fairly normal shape. Additionally, Ian's hip had a very short femoral neck, which was angled down significantly. Essentially, Ian's infection had indeed destroyed, or at least injured, a significant amount of the growth potential of his upper femur. This manifested in a 2-centimeter difference in leg length by the time he turned four years old.

Because his left leg was shorter than his right, Ian reported intermittent pain and started to develop a contracture in his left Achilles tendon from trying to stand on his toes to equalize his leg length, despite using a lift in his shoe. Continued x-rays showed a lack of growth and development of his upper femur, so Dr. Esposito anticipated that without intervention his left leg would continue to worsen and grow to be several inches shorter as he aged.



Over the next few years, Ian visited Dr. Esposito in Omaha several times a year while his parents kept a close eye on him at home.

“He was very limited in his activity,” Lori recalled. “He wasn’t allowed to jump off of things and he had to wear lots of orthopaedic shoes. A few times he got in trouble at preschool because he wouldn’t sit cross-legged, until I told them that his body wouldn’t let him.”

Around the time Ian turned seven, he and his family elected for him to undergo his second major surgery. Dr. Esposito performed a pelvic osteotomy of the left hip, with the goal of deepening the hip socket in order to gain approximately a centimeter of length in his leg. He also performed an osteotomy with custom instrumentation with wires, in order to correct the deformity of his upper femur, put it in a more normal position and gain some additional length.

“Despite Ian’s horrific early infection there was clearly some growth potential in his upper femur, but the abnormal forces across the hip were interfering with his growth,” Dr. Esposito said.

Ian, a first grader at the time, clearly remembers going in for his surgery. “I remember when they were knocking me out with the heavy stuff the last thing I saw when I was looking up at the doctors, instead of people operating on me, they were penguins,” he laughed. “Not kidding. The penguins were just looking at me, talking. ‘Scalpel please?’”

His operation and subsequent 6-week stint in a hip spica cast brought along challenges for Ian and his entire family. Because of the cast, Ian couldn’t walk or stand and was effectively wheelchair-bound while his hip recovered from surgery. But the twins, in particular, handled it well.

“Ian was a champ,” Lori said. “And Nolan was the helper champ. It was pretty amazing to watch a 7-year-old take care of and clean up after his brother. We were very proud of both of them.”

During his time in the cast, Ian earned the nickname “green machine,” because his cast was bright green. Nolan took the lead on pushing Ian around in the wheelchair. His parents decided to splurge and bought the boys Sega Genesis,

Top: Arthrogram done at age 2 years, 11 months, shows a reasonably shaped femoral head.

Middle: At age 7, the angulation was corrected which also regained some length. Iodine dye was placed into the hip showing a reasonably shaped joint.

Bottom: At age 13 years, 11 months, he still has a mild leg length difference, but his correction is maintained, and his strength and motion is excellent.



"IAN WAS A CHAMP, AND NOLAN WAS THE HELPER CHAMP. IT WAS PRETTY AMAZING TO WATCH A 7-YEAR-OLD TAKE CARE OF AND CLEAN UP AFTER HIS BROTHER. WE WERE VERY PROUD OF BOTH OF THEM."

Lori Hemmett

their first video game. The twins and their father took to building pillow forts in the basement, shooting each other with nerf guns and playing lots of Legos and Hot Wheels.

"We actually had a lot of fun," Ian said. But when it came time to take the cast off Ian was more than ready. Shortly after his cast was removed, Ian asked to bring his bicycle along to his next appointment with Dr. Esposito.

"He insisted that I come out to the parking lot and watch him ride his bike, as he had not been able to before surgery," Dr. Esposito said. "He vigorously wheeled around the parking lot and the joy on his face was marvelous to see."

Besides a small procedure to remove some of the hardware when Ian was in 5th grade, he has continued with life like any active 14-year-old. He has exceeded all of Dr. Esposito's expectations and now only has a 1.5 cm difference in leg length, which requires only a small lift in his shoe. He has excellent motion and hardly any pain. In fact, he rarely even thinks about his leg. Ian and Nolan are now high school freshman, and plan to go out for the baseball team in the spring. Both boys also worked as Runza salesmen at Husker football games in Lincoln.

Above all, Ian's experience has taught him a few important lessons, including strength and courage in the face of difficult surgeries and grueling rehabilitation. It has also given him a unique outlook on living life with a less-than-perfect leg.

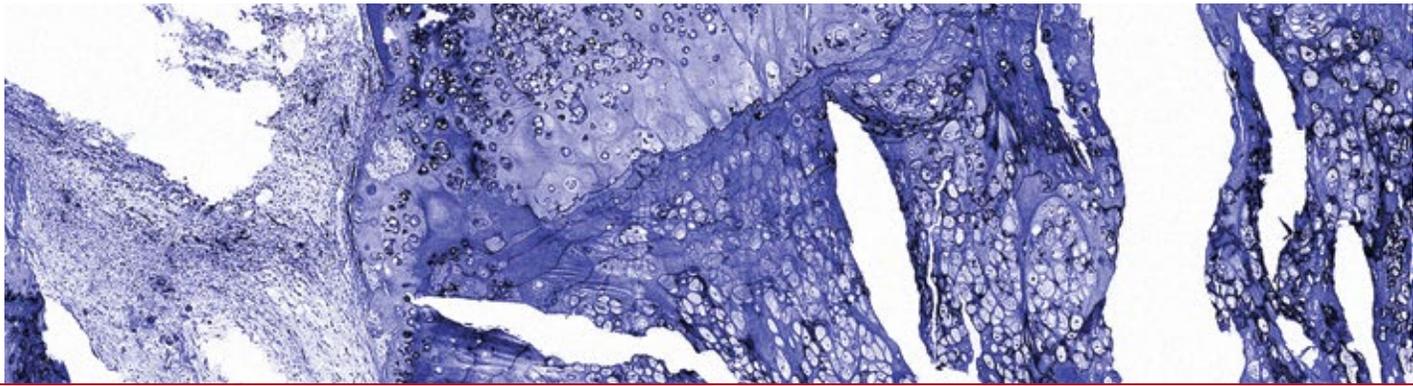
"One thing I've learned is that you can't ever use it as an excuse, because that's going to get you nowhere," Ian said.

Dr. Esposito does anticipate that Ian will require further treatment – and a potential hip replacement surgery – but will most likely do well into middle age. His case demonstrates what can be accomplished when trust is developed between a patient's family and the orthopaedic team. Although Dr. Esposito could make no guarantees early in Ian's life that the surgeries would make a difference, he and his family were dedicated to his rehabilitation, and supportive of him achieving his maximum function and outcome.

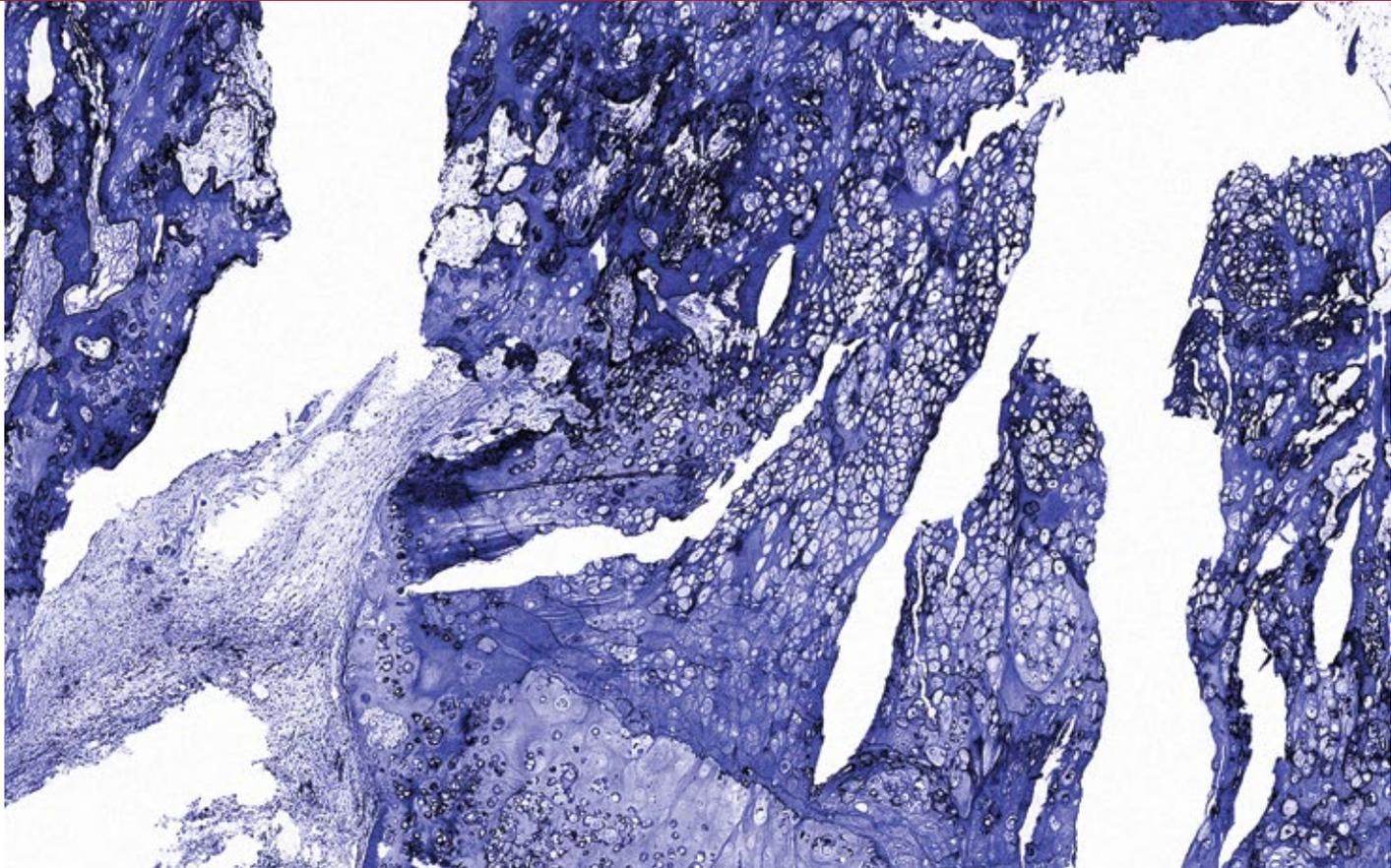
As an academic medical center, UNMC is able to provide a unique experience for patients like Ian who require specialized care from infancy through adulthood. As treatments and surgical techniques are improved and as new faculty are recruited, physicians are able to follow patients over a long period of time, often in the same academic group. This longevity allows for better monitoring of outcomes, so that surgeons are able to see what works and what doesn't, all with valuable input from the patient.

"As Ian approaches adulthood, I am comfortable that my colleagues who treat him in the future will be able to offer him the best and least invasive treatment necessary to allow him to lead his life normally as an active, comfortable and productive adult," Dr. Esposito said. ■





ORTHOPAEDIC
ONCOLOGY





FIGHTING CANCER
**ONE STROKE
AT A TIME**



Two years ago, 11-year-old Hannah Nelson was playing with a friend at the Nelson's house in Yankton, South Dakota. The girls were running up the stairs when her friend accidentally bumped into Hannah's leg.

"That's my bad leg," Hannah said.

Theresa Nelson, Hannah's mother, heard the commotion from another room. She thought, *What bad leg?* While Hannah had a history of leg pains in the past, it was never anything a good leg rub couldn't fix. Hannah was active in dance and swimming, and up until that point, her leg had never stopped her from practicing and competing.

Aside from her "bad leg" comment, Hannah seldom mentioned the pain in the following weeks. For Theresa, however, Hannah's bad leg was all she could think about.

"It was like a magnet," Theresa said. "It was the most bizarre thing. The girl was not complaining but I couldn't get my mind off of it."

Theresa prayed about Hannah's leg every night. She started having nightmares about cancer, after which she would wake up shaking, thinking she had gone crazy. Eventually, enough was enough.

Theresa scheduled an appointment with Hannah's pediatrician, who performed an x-ray.

One look at the image and he knew something was wrong. The x-ray revealed a significant 12.5 cm tumor in Hannah's left distal tibia (lower leg near the ankle), something most pediatricians will see maybe once or twice in their careers. While the x-ray was concerning, a biopsy would be needed to confirm a diagnosis. Their pediatrician immediately advised them to see a specialist.

The Nelsons called Children's Hospital & Medical Center in Omaha and were sitting in the office of Minnie Abromowitch, M.D., the very next day. Dr. Abromowitch, a pediatric hematologist-oncologist, referred Hannah to see UNMC orthopaedic oncologist Sean McGarry, M.D., for testing.

A biopsy confirmed Dr. McGarry's suspicions: the tumor was a fast-growing osteosarcoma. A rare form of bone cancer, osteosarcoma appears in roughly 1,000-1,200 children and adolescents each year, typically in the second decade of life. Most often, osteosarcoma is treated with several rounds of chemotherapy and surgery to remove the mass.



Dr. McGarry then ordered a CT scan of Hannah's lungs and a whole-body bone scan, which verified that the cancer had not spread to other parts of the body. Hannah underwent bloodwork and an echocardiogram to establish the baseline function of her heart. She also had a port placed for long-term IV access. She immediately began three months of chemotherapy at UNMC's pediatric hospital partner, Children's Hospital & Medical Center. With the treatment came an intense pain surrounding the mass in her leg, Hannah recalled.

"We couldn't believe she was in that much pain," Theresa said. "She couldn't walk and had to use crutches. At that point, I think Hannah finally comprehended that it was something serious."

After two rounds of treatment, Dr. McGarry sat down with Theresa and Hannah's father, Tom, to discuss the next phase of treatment. In 90-95 percent of osteosarcoma cases, Dr. McGarry is usually able to perform a limb-salvage surgery. Unfortunately, Hannah's case was anything but usual.

"Because of the location of her tumor, I knew from looking at her original x-ray and MRI that we were likely going to have to do an amputation," Dr. McGarry said. "Cases of osteosarcoma of the distal tibia are the ones that most often end up in an amputation because there are no good reconstructive alternatives for an ankle."

For the Nelsons, the news that Hannah would undergo a below-knee amputation was shocking. In just a few short weeks, she went from having slight leg pain to facing the reality of living life without her lower leg. Tom and Theresa made the decision to tell Hannah about the amputation three weeks before the surgery, in order to give her enough time to process the information, but not enough time for the information to consume her.

"Cancer is just a horrible, ugly thing," Theresa said. "As a child, how do you process that? It makes you stop and just gather around each other. We were with her for every second, every minute, every day."



Dr. McGarry performed the amputation in June 2014. Six weeks later she was fitted for her first prosthetic and then completed several more months of chemotherapy. By winter time, Hannah had finished treatment and was still getting used to her prosthetic when she suffered another setback.

On March 14, 2015, almost a full year since her diagnosis, Hannah was again playing with a friend at the Nelson's house when she slipped and suffered a distal metaphyseal femur fracture. The fracture was most likely the result of bones weakened by chemotherapy and lack of use while Hannah was easing into her new prosthetic.

She was initially put into a cast, but the Nelsons again sought the opinion of Dr. McGarry in Omaha. Dr. McGarry took Hannah back to the operating room, this time for an open reduction and internal fixation, in which he placed a plate and screws to fix the fracture. Because of her age and the fact that she is still growing, Dr. McGarry decided to remove the hardware in June 2016, after school let out for the summer. Despite the additional surgeries, the setback hasn't stopped Hannah from returning to day-to-day life.

"She has since gotten back into the prosthesis and gotten much more ambulatory," Dr. McGarry said.

While she hasn't quite gotten back into dance, Hannah has stepped back into the pool, which was a big, emotional first step in a long journey. She's even done a few dives off the starting block and has made it her goal to swim competitively again. Earlier this year she earned a part in her school's play, *The Lion King*, and was a member of the Science Olympiad, all while keeping up her grade point average. Hannah also enjoys reading, writing and playing with her dogs, Jazz and Chip. She aspires to become a writer someday.

Throughout her two-year experience with osteosarcoma, Hannah has always done her best to look on the bright side of things. She's the first to tell you that even though she will always bear the physical scars of her battle, she hasn't lost anything. In fact, she's gained something even more valuable.

"CANCER IS JUST A HORRIBLE, UGLY THING, AS A CHILD, HOW TO DO YOU PROCESS THAT? IT MAKES YOU STOP AND JUST GATHER AROUND EACH OTHER. WE WERE WITH HER FOR EVERY SECOND, EVERY MINUTE, EVERY DAY."

Theresa Nelson



"I think maybe I appreciate everything more now," she said.

Dr. McGarry is one of just 180-200 surgeons in the country who specialize in orthopaedic oncology and limb-salvage. Even though he is one of the few orthopaedic oncologists in the region, he still only sees eight or ten osteosarcoma patients each year. This allows him to make strong personal connections with each of his patients.

"He and his team are very special people and we are blessed to have met them," Theresa said. "Hannah has had no nerve pain, which

is a big testament to his skills as a surgeon. Everyone is just blown away with how wonderful her leg looks."

Dr. McGarry's careful attention to Hannah and her family made a scary experience just a little bit easier. He even paid a special visit to Hannah at Children's Hospital & Medical Center during one of her chemotherapy sessions.

"He saved my life basically," Hannah said. "And he made my leg look as pretty as it can be." ■



SPORTS MEDICINE



As an Omaha business owner and father of three, Tate Meier keeps plenty busy. He dealt with nagging hip pain for years but was determined to keep up with his active lifestyle. After numerous failed attempts at treatment, he knew it was time for a change.

Meier's left hip first started bothering him two decades ago while playing baseball for Wayne State College. He had a hip arthroscopy in 1999 in hopes of alleviating his pain, and it allowed him to continue pitching during his final season. Despite his body's protests, Meier also kept busy coaching baseball, running and lifting.

"It was painful, but when you're young you just get through it," he said.

He noticed his body starting to break down in 2007, and he progressively became weaker as time passed. In addition to his hip, Meier also experienced significant pain in other parts of his body.

"Some of the worst pain and irritation was in my right shoulder," he said. "At that point, I had gone through years of education and therapy with my physical therapist, and knew that if my left hip was healthy and I was able to move and stride correctly, it would greatly affect my shoulder and right side of my body."

He tried a host of non-surgical options, including physical therapy, chiropractic care, massage and yoga. He started getting hip injections, but soon realized he needed a new approach. In search of a surgeon who understood his pain and agreed to operate on an otherwise healthy, young man, Meier enlisted the help of his physical therapist, his former physician and his sister, a nurse. They led him to Mark Dietrich, M.D., a sports medicine specialist and arthroscopic surgeon at UNMC.

In December 2014, Dr. Dietrich performed a physical exam and reviewed x-ray and MRI images, which confirmed the cause of Meier's

pain: significant femoral acetabular impingement (FAI) with associated chondrolabral degeneration. Put plainly, Meier's proximal femur (thigh bone) was mismatched with his acetabulum (hip socket). Because they do not fit perfectly, the hip bones rub against each other, which causes damage to the cartilage and labrum of the hip joint.

"This usually manifests in pain with activity, sometimes pain at rest," Dr. Dietrich said.

"There can also be mechanical symptoms, like catching or locking of the hip."

Of the three types of FAI, and Meier's imaging indicated a cam-type impingement, in which the femoral head is not round and cannot rotate smoothly inside the acetabulum. Because Meier had already tried numerous conservative measures to relieve pain, Dr. Dietrich decided to perform a hip arthroscopy with an acetabular rim trimming, labral repair and proximal femoral osteoplasty. This procedure involves making two small incisions, through which he can repair the torn labrum and recontour the hip socket and thigh bone to prevent further injury and impingement.

Luckily for Meier, surgical treatment options for FAI have greatly improved over the years. Back when Meier first started experiencing pain, this type of surgery wasn't even available. Today, Dr. Dietrich can perform the surgery arthroscopically, which is less invasive than an open surgical hip dislocation. He is highly skilled in this procedure, and typically sees about 220 FAI cases each year. Furthermore, Dr. Dietrich has had the procedure himself, which gives him a unique perspective and allows him to better connect with patients.

"MOST DOCTORS LOOK AT ME AND TELL ME I'M YOUNG, AND THEY WON'T OPERATE, THE WAY I LOOK AT IT, 20 YEARS FROM NOW I MIGHT NEED A NEW HIP. BUT I'D RATHER BE HEALTHY FOR THOSE 20 YEARS."

Tate Meier

GETTING BACK INTO THE
SWING OF IT

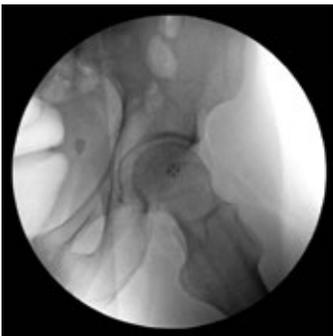


Figure 1: Preoperative x-ray showing significant cam-type impingement in left hip

Figure 2: Postoperative x-ray of left hip

“In my own experience, this surgery makes a big difference,” Dr. Dietrich said. “In Tate’s case, we aimed to improve his activity level and pain level for an extended period of time. We hope to delay or possibly even prevent a hip replacement in the future, but it’s not a guarantee.”

Dr. Dietrich operated on Meier’s left hip in January 2015. Meier immediately began physical therapy. He gradually increased his activity levels, but was restricted from high-impact activity for at least 12 weeks to prevent fractures. Meier still has good and bad days, but his pain – in both the hip and shoulder – is considerably better than it was prior to surgery.

“My hip moves better and my shoulder has loosened up,” Meier said. “I can get through my hip now, instead of going around it. There is weakness that will never go away and I know I’ll never feel as good as I did 20 years ago, but it’s better than it was two years ago.”

These days, he is able to handle daily activities, like bending down to tie his shoe, or reaching to

the backseat of his car to hold his daughter’s hand. More than that, he can play a round of golf, lift weights and go for a run without debilitating pain.

With his left hip pain under control, Meier elected to undergo the same procedure on his right hip in November 2016. The decision to go under the knife again wasn’t easy, but the long-term benefits outweighed the drawbacks. Dr. Dietrich’s understanding and willingness also played a role.

“Most doctors look at me and tell me I’m young, and they won’t operate,” Meier said. “The way I look at it, 20 years from now I might need a new hip. But I’d rather be healthy for those 20 years.”

Dr. Dietrich is optimistic that patients like Meier will experience better function and reduced symptoms over the long term as a result of early arthroscopic intervention. As treatments for FAI evolve, Dr. Dietrich and other specialists foresee the possibility that such arthroscopic treatment may stall or entirely prevent the need for a hip replacement in the future. ■



ORTHOPAEDIC
RESEARCH

ORTHOPAEDICS BIOMECHANICS AND
ADVANCED SURGICAL TECHNOLOGIES

LABORATORY



The UNMC Department of Orthopaedic Surgery and Rehabilitation is one of the country's largest academic facilities conducting groundbreaking technological and clinical research which can influence the future of orthopaedic surgery.

A POCKET OF EXCELLENCE IN ORTHOPAEDIC RESEARCH

When Hani Haider, Ph.D., joined the faculty of the University of Nebraska Medical Center's Department of Orthopaedic Surgery and Rehabilitation in 2000, he brought with him a budding reputation in one area of preclinical orthopaedic implant mechanical testing, and two new exciting ideas. This department report provides a chance to tell the stories of our achievements and our many scientific ventures.

WHAT MIGHT HAVE BEEN: PIEZO-ELECTRIC POWER GENERATION AND MICRO-COMPUTERS INSIDE HIP AND KNEE REPLACEMENTS

One of Dr. Haider's novel ideas was to insert a micro-computer chip inside all hip and knee replacement systems. With miniature sensors and packaged electronics onboard, the chip would wirelessly transmit useful information to diagnostic instruments outside the body during post-arthroplasty follow-ups, to achieve one or more of the following:

- 1) Detect micro-motion to signify early failed implant fixation
- 2) Sense excessive wear or concentration of wear debris particles and flag them prior to osteolysis and loosening
- 3) Detect early local signs of infection, flagging the need for earlier and less invasive prognosis
- 4) Monitor and log patient levels of activity, extremes of motion (like stumbles) or imbalance of forces (like varus valgus knee misalignments)
- 5) Simply and initially store relevant patient, implant and surgery records which would be useful for revision surgery, for triggering security in airport access or to increase MRI safety

The problem was finding the best source of electrical power to drive such electronics in vivo, and for the remaining lifetime of the patient. The most advanced batteries would not be small enough in size or big enough in capacity to last the life of the implant in vivo. Dr. Haider’s innovation was to introduce the use of solid-state piezo electric crystal elements for this application, which utilize the large and dynamic forces transmitted by the artificial joint to generate minute amounts of electric charge to be rectified, regulated, stored and used for onboard electronic power needs.

On modest funding, a pilot study was performed in Nebraska between 2000-2004 and provided the first ever proof of feasibility of this (then) novel idea. With Nebraska-built electronic circuitry, enough voltage was generated with miniature piezoelectric elements within a knee replacement tibial tray in a groundbreaking bench top experiment. As a proof of concept, with physiological knee forces on a test machine, the piezo-electrically powered microprocessor and associated miniature circuitry managed the first ever successful count of simulated walking steps from the knee forces used to power it.

While this technology was not patented for Nebraska, the collaborative team from UNMC and UNL published the results in two esteemed journal articles in Engineering Mechatronics, the Orthopaedic Research Society and the American Academy of Orthopaedic Surgeons (AAOS). A poster at the 2004 AAOS Annual Meeting with the title, “Self-powered computers within prosthetic joints – is it time?” raised eyebrows and directed much attention to Nebraska. This groundbreaking innovation spurred international interest and a whole new line of thinking and associated industry.

UNIVERSITY OF Nebraska

Self-powered computers within prosthetic joints – is it time?

Haider, H, Platt, SR, Farritor, SM and Garvin KL

Introduction

Dynamic stress on piezoelectric materials can convert a small amount of mechanical energy into electrical energy. Placing such elements in the tibial tray or stem of a TKR or THR implant, the forces through them during daily activities can produce electrical power within miniaturized electronics on board the implant.

Our ultimate goal
In-vivo diagnostics for early detection of:

- implant wear
- misalignment
- loosening
- and self-adapting implants

Materials & Methods

An analytical model of the mechanical and electrical properties of piezoelectric materials was used to estimate the electrical power that could be generated for different sizes, shapes, and types of materials.

Mechanically they were modeled as an elastic body producing voltage proportional to the mechanical strain and material property constants.

Electrically, piezoelectric ceramics generally produce high voltage and small charge (current). They are modeled as a voltage source in series with a small capacitance.

Using the constitutive equations and the model circuits shown opposite, theoretical simulations were performed to optimize the choice of piezo elements by computing the effects of the electric resistive circuit load and the capacitance used for electrical energy storage.

Constitutive equations

$$\sigma = eE + \epsilon_0 \epsilon_r E$$

$$D = \epsilon_0 \epsilon_r E + e \sigma$$

σ = stress
 ϵ = strain
 ϵ_r = relative permittivity
 ϵ_0 = permittivity of free space
 e = piezoelectric strain coefficient (constant)
 D = charge displacement (total charge (C) per unit area (C/m²))
 E = electric constant
 σ = magnitude of the electric field

SETTING THE STANDARD: A HAVEN FOR IN-VITRO TESTING OF JOINT REPLACEMENT SYSTEMS

Since the beginning of Dr. Haider’s tenure at UNMC, Dr. Haider and his team have dedicated almost two decades to establishing one of the preeminent implant testing laboratories internationally. Using a suite of knee and hip simulators and other innovative testing machines, the lab has simulated the duty of an arthroplasty implant to allow it to be durability-tested in vitro. Mimicking the lifelike forces, torques, linear motions and rotations of artificial joints (such as in repetitive human walking gait), the prolonged wear and tear on artificial joints has been tested.

“It is the wear debris in the form of billions of tiny particles of worn polyethylene bearing material, most of which are less than one half of a thousandth of an inch that can, in time, cause osteolysis and implant loosening,” Dr. Haider said. “So it is the debris that is the curse of wear in all orthopaedic implants, and there is a billion-dollar industry trying to reduce it.”

The lab's testing provides practical feedback on many of the material couples used in hip and knee implants. Implant function is also assessed, such as the knee's range of motion, constraint, and other attributes of design. Often times, the tests performed in Omaha are relied upon by outside companies to receive FDA or other regulatory clearance for clinical use in the U.S. and abroad. Since 2000, the lab has attracted more than \$10 million in private and government funding for this purpose. Dr. Haider and his team have completed 75 different implant testing contracts from 26 different companies and other universities, mostly from the United States, but some from Germany, France, Italy and Japan. Their work also helped develop many international standards of how to pre-clinically test implants for patient safety and regulatory purposes. This level of industrial interest and number of contracts from such a wide spectrum of international manufacturing companies has firmly engraved the name of Nebraska as a haven for innovative excellence in the world of orthopedic implant technology testing.

PATENTED INVENTIONS AND RESEARCH AWARDS

Another of Dr. Haider's ideas was to rid knee replacement procedures of the hundreds of mechanical instruments used in surgery. These jigs are numerous, cumbersome and bulky to handle and process in the hospital. They are also procedure- and implant-specific, intimidating, training-intensive, expensive and imperfect in their function. Dr. Haider leveraged modern computer-aided techniques of navigating bone resection jigs (as most navigation systems do) to, instead, directly navigate bone saws and drills in the hands of a surgeon during a procedure. Direct visual feedback is given to the surgeon during bone resection, including slowing the instrument down or stopping upon excessive deviations from a pre-surgical plan. The team envisaged, prototyped and perfected a freehand surgical navigation system for use in total knee replacement surgery that allows for more accurate bone cutting and better alignment of implants.

The successful pilot efforts eventually led to the lab receiving a four-year, \$4.1 million grant from the U.S. Navy in 2010, to help move the technology forward from a concept to a prototype with full system functionality. Nebraska's utilitarian approach secured two invention patents and much international attention. This novel technology has the potential to make arthroplasty easier, faster, cheaper and better. Teaming with Kevin Garvin, M.D. and other faculty members, these scientific achievements have been published in the most prominent clinical journals and presented to surgeons worldwide, with Nebraska's name firmly known as its birthplace. The latest developments miniaturized a whole navigation system of tracking and laser projection (onto the bone for guidance), all onboard a smart bone resection saw.

Dr. Haider is internationally recognized as an expert in orthopaedic implant simulation and testing, and his various methodologies have been adopted as International Standard Test Methods. His work with the International Standards Organization (ISO), the American Society for Testing and Materials (ASTM) and the International Society for Technology in Arthroplasty (ISTA) have earned him numerous awards for his many contributions:

AWARDS:

- 2015 Leroy Wyman Award, ASTM International F04 Committee
- 2014 ISO Committee Chairman's Award, ISO
- 2013 "Honorary Lifetime Membership," ISTA
- 2010 Manny Horowitz Award, ASTM
- 2005 Robert Fairer Award, ASTM
- 2005 HAP Paul Award, ISTA

PATENTS:

- In 2013, after years of design, testing and refinement on their freehand surgical navigation system, Dr. Haider and the team were issued a U.S. Patent for "Method and Apparatus for Computer-Aided Surgery."
- The team also expects to receive a second patent which has been allowed by the USPTO for "On-Board Tool Tracking System and Methods of Computer Assisted Surgery," which was submitted in 2009-10.



WHAT'S NEXT: FRICTION WHEN MOVING

Most recently, Dr. Haider and his team have completed the exciting process of moving the lab to the department's new space in the Lauritzen Outpatient Center. Safely and successfully relocating the lab after 13 years involved much effort and anxiety, but it resulted in the lab finally reuniting with the department's clinical faculty on UNMC's main campus. The lab team, made up of Joel Weisenburger, Kevin Swierczek, Alvaro Pinto and David Lusk, completed much of the uninstallation and packing themselves.

"I have been blessed with a most wonderful team," Dr. Haider said. "They are champions in how they packed and are now re-installing tens of tons of intricate equipment. A lot of friction and energy are dissipated while moving a 5,000 sq. ft. lab, albeit a few miles down the road."

The team will quickly transition into working on friction of another type, measured with the lab's one-of-a-kind friction machine. This machine was designed and custom manufactured in the Biomechanics Lab by Dr. Haider and several technicians a few years ago and had various refinement iterations until it was commissioned for testing in 2016.

The friction measuring machine works by taking a pin of an orthopaedically relevant bearing material such as UHMWPE, and rubbing it under a known compressive force against a smooth level disk of another material. Often the latter is a metal such as the cobalt-chrome alloy used in orthopedic implants. The disk turns underneath the pin, causing the pin to "want to" move. However, the movement is prevented by a lever arm connected to a load cell that measures the very force that causes it to drift on the turning disk. This process yields two important pieces of information: the frictional force (causing the pin to tend to drift) and the downward force (pressing the pin against the disk). Dividing the former force by the latter gives a good estimate of the coefficient of friction. When dealing with orthopaedic implants, material couples with a low coefficient of friction are usually desirable, since the materials slide easily against each other and would likely show less wear over time.

What makes this friction measuring machine unique is the system of "air bearings" which allows the main assembly carrying the pin to float on a smooth cushion of steady compressed air with virtually zero resistance leaving only the frictional force between the pin and disk as the acting force, balanced and measured by the load cell. This machine allows a very high "dynamic range" of friction to be accurately measured even under a wide range of compressive stress undergone in orthopaedic joints. The general goal is to have an early and efficient way to screen and compare compatible material couples for orthopaedic implants.

"Natural human synovial fluid is absolutely amazing for reducing friction, even with metal and plastic implants," Dr. Haider said. "We first compared how closely we simulate this with diluted bone calf serum as a lubricant, and we use the latter for the bulk of our experiments."

Dr. Haider and research engineer Joel Weisenburger are now collaborating with the team at MGH Hospital of the Harvard Medical School. Using the lab's unique friction measuring technology, Dr. Haider's team has found that while lower friction ultimately reduces implant wear, one of the lowest wearing highly cross-linked UHMWPE versions oddly shows higher friction than the conventional material. The experts at MGH are trying to solve that riddle with a variety of newer UHMWPE processes.

Sixteen years after Dr. Haider's arrival with his ideas, Nebraska's lab has grown into one of the country's largest academic laboratories dedicated to the advancement of orthopaedic joint replacement technology. The lab's international acclaim, contributions to implant evaluation and testing standards, and patented technology are just a few reasons why Omaha has become a center of excellence in orthopaedic research.

"The future is bright, I feel that we are just starting," Dr. Haider said. "Our move to the brand new Lauritzen Outpatient Center puts us physically closer to our surgeon colleagues, and I hope it may help us achieve more."

MAKING ADVANCEMENTS IN PATIENT CARE THROUGH **CLINICAL RESEARCH**

As with any discipline, research is needed to improve outcomes. As such, the department developed an orthopaedic surgical database registry in 2005, with the purpose of ensuring that diagnosis and treatment are continually evolving and improving within the Department of Orthopaedic Surgery and Rehabilitation.

Any patient who sees an orthopaedic surgeon at UNMC may be included in this database. In general, outcomes collection is initiated at the pre-operative clinic visit, during which the surgeon completes a physical examination of the affected area and the patient completes questionnaires regarding their pain, function, range of motion and quality of life. After that, patients are followed for life and their surgery outcomes are collected at regular intervals. Those who do not return for follow up visits are mailed the assessments to complete and return. Regular and consistent collection of these outcomes measurements, followed by accurate interpretation and detailed analysis, guides treatment modifications, which in turn improve patient care and outcomes. To date, 7,700 surgeries at UNMC are being actively followed and provide data for numerous other specific research studies.

Currently, there are 12 faculty members and 15 residents from the Department of Orthopaedic Surgery and Rehabilitation who are named as investigators in a total of 38 human research studies. In addition, department members completed seven research studies in 2016 and numerous other studies are in development.

Some of our studies are large, multi-center clinical studies conducted cooperatively at multiple centers throughout the country. This allows researchers the advantage of being able to enroll a large number of subjects, which increases the generalizability of the results. For example, one such study currently underway will enroll 1,000 subjects over a 3-year period at our UNMC site alone, with a total overall enrollment of 25,000 subjects at 25 sites nationwide.

The majority of the research studies within the Department of Orthopaedic Surgery and Rehabilitation are investigator-initiated, as opposed to a pharmaceutical or device company funding, initiating and designing the investigation. Many of our investigator-initiated studies are in collaboration with other UNMC Departments (including Neurology, Cardiology, Rheumatology, Regenerative Medicine, Genetics Cell Biology & Anatomy, Pathology & Microbiology and Infectious Disease) and various local study sites (including Children's Hospital & Medical Center; CHI Health Creighton University; Omaha VA Medical Center; Nebraska Orthopaedic Hospital, and OrthoWest). Research collaboration not only enhances the ability to share and exchange resources, but also brings together some of the brightest minds in medicine. As such, endless opportunities exist to share and learn from these complementary disciplines. Different perspectives, experience and knowledge stimulate new ideas and new approaches.

The following is a list of all current outcomes, clinical, interventional and sponsored studies taking place in the department, including one in collaboration with Omaha VA Medical Center, one in collaboration with CHI Health Creighton University Medical Center and several in collaboration with Children's Hospital & Medical Center:

ACTIVE

- Orthopaedic Registry to Monitor Treatment Outcomes
- Assessing Reaction Times Post Hip/Knee Joint Replacement Using Driving Simulator
- Comparative Effectiveness of Pulmonary Embolism Prevention After Hip And Knee Replacement (PEPPER): Balancing Safety And Effectiveness
- Descriptive Analysis of The Effect Of Surgeries On Human Immune Status
- Immune Panel Repertoire
- In Vitro Models of Cartilage Development, Homeostasis, And Disease
- UNMC Rheumatology Serous/Synovial Fluids and Tissue Bank
- Biological Augmentation of Rotator Cuff Repairs Using Biomesh Strengthened 3D Bioprinted Scaffolds
- Low Energy Open Ankle Fractures in The Elderly. A Multicenter Retrospective Review Study
- Pre-Surgical *S. Aureus* Colonization and Outcomes of Total Joint Arthroplasty
- Outcomes of Total Hip Replacement Utilizing Oxidized Zirconium Femoral Heads on Cross-Linked Polyethylene
- Long Term Follow-Up of Joint Infections After Re-Implantation
- Minimum 13-Year Follow-Up of Total Hip Arthroplasty with Longevity Highly Cross-Linked Polyethylene Liners
- The Cause of and Treatment for Total Knee Arthroplasty Stiffness
- Clinical Function Correlates with Ideal Biomechanical Reconstruction
- Radiographic Outcomes of Total Hip Replacements Utilizing Cross-Linked Polyethylene
- Comparative Effectiveness of Pulmonary Embolism Prevention After Hip And Knee Replacement: Balancing Safety And Efficacy. (Warfarin Vs. Aspirin Vs. Xarelto)
- Manipulation Under Anesthesia (MUA) To Treat Postoperative Stiffness After Total Knee Arthroplasty: A Multicenter Randomized Clinical Trial
- The Coefficient of Friction of Human Osteoarthritic Cartilage on Joint Repair Materials Lubricated by Human Osteoarthritic Synovial Fluid (HOSF)
- The Utility of Oral Antibiotic Therapy Following 2-Stage Revision Arthroplasty for Infected Prosthetic Hips and Knees
- A Retrospective Review of Hybrid Total Knee Arthroplasty Outcomes
- Manipulation Under Anesthesia to Treat Postoperative Stiffness After Total Knee Arthroplasty: A Multicenter Randomized Clinical Trial
- Outcomes of Total Hip Arthroplasty For Post Traumatic Arthritis After Acetabular Fracture
- Readmission Rates and Reasons
- Patient Outcomes Following Rotationplasty Treatment (Versus Expandable Prostheses) For Osteosarcoma of The Distal Femur or Proximal Tibia
- Distinguishing Commensal versus Pathologic Staphylococcus Species in Cases of Fracture Nonunion After Internal Fixation
- CT Vs. X-Ray in Measuring Displacement and Angulation in Clavicle Fractures
- A Fracture Boot Stress Model for the Determination of Ankle Stability in Patients with Isolated Fibular Fractures
- An Evaluation of Antibiotic Administration in Treatment of Open Fractures
- Registry for Orthopaedic Trauma in Children
- Hoverboard Injuries in Children
- A Retrospective Study on the Association of Internal Injuries with Femoral Fractures
- Postoperative Outcomes of Hip Fracture Surgery on Older Patients on Clopidogrel or Warfarin at the Time of Surgery
- Latrogenic Sciatic Nerve Dysfunction After Posterior Approach for Treatment of Acetabular Fractures with and Without Hip Dislocation
- Pneumatic Tourniquet Use Without Padding in Upper Extremity Surgery
- Outcomes of Proximal Humerus Fracture in Patients with Underlying Glenohumeral Arthritis
- Defining The Role of Head of Bed Angle in Cerebral Deoxygenation Events During Upper Extremity Surgery in The Beach Chair Position
- Long Term Outcome Follow-Up of Glenoid Anchor Peg Component Fixation Utilizing Autologous Bone Graft in Total Shoulder Arthroplasty

COLLABORATIVE RESEARCH

PROGRAMS AND EDUCATIONAL OPPORTUNITIES

MULTIDISCIPLINARY PROGRESS

One of the great benefits of being part of Nebraska's only public academic health sciences center is that we can easily collaborate with the brightest minds in multiple departments to offer our patients the best in today's treatment methods. Many of our orthopaedic faculty members conduct clinical outcomes research, interventional studies and sponsored studies in conjunction with other world-class clinicians and researchers throughout the University of Nebraska Medical Center, and the results are staggering. In the 2015-2016 academic year alone, UNMC set a new record for research grants and contracts – \$115.1 million. In particular, department faculty are currently conducting collaborative research in the areas of genetic defects, staphylococcal-related infections and disease and arthritis.

Making advancements in orthopaedic surgery research

Cartilage and bone disorders that result from genetic defects, aging or injury have a major impact on quality of life and economic welfare, as do infections. Researchers from the departments of Orthopaedic Surgery, Microbiology/Pathology and Infectious Disease are collaboratively expanding the understanding of prevalent osteoarthritis and staph infections, as well as advanced treatment for these conditions, through in vitro study to replicate relevant cellular interactions and microenvironments in diseased, non-diseased and aging tissue.

Previously, model organisms helped researchers gather extensive findings on the processes of skeletal development, homeostasis and degeneration. However, those advancements have been limited by the relative lack of information about how human genetics, injury and disease

disturb skeletal cell biology, endogenous repair and regeneration. With patient permission, bone, cartilage, connective tissue, marrow and synovial fluid that would otherwise be discarded are now collected and distributed to multiple laboratories across campus. (Each specimen includes patient age, gender and orthopaedic diagnosis, yet all personal identifiers are removed.) These specimens support researchers in making intelligent connections between the effects of specific molecular processes and patient observations.

Center for Staph Research

The UNMC Center for Staphylococcal Research (CSR) is the first in the nation dedicated to staphylococcal research and translational treatment strategies. A true UNMC collaborative research group, the CSR utilizes a team approach to lessen the impact of staphylococcal disease on human health. The CSR is dedicated to further understanding staph and improving the ability to prevent, diagnose and treat staph-related disease, which is the leading cause of nosocomial and implant-related infections nationwide.

The Department of Orthopaedic Surgery and Rehabilitation's research at the CSR focuses on the management of musculoskeletal infections caused by emerging multi-resistant strains of bacteria in the surgical setting. Our department is also very fortunate to be working together with researchers from Infectious Disease, as well as basic scientists from Pathology and Internal Medicine who are studying staph infections. In addition to the pathogenesis of staph infection, there is ongoing collaboration with Dr. Tammy Kielian regarding the eradication of post-arthroplasty *Staphylococcus aureus* biofilms, as well as Dr. Dong Wang's project for early detection and intervention of orthopaedic implant loosening using polymer theranostics.

Nebraska Arthritis Outcomes Research Center

Through a collaborative effort between the departments of rheumatology and orthopaedic surgery, researchers at the Nebraska Arthritis Outcomes Research Center (NAORC) are exploring the determinants of poor surgical outcomes among U.S. veterans with arthritis undergoing joint replacement. Results will guide the development of future preventative and operative treatments to improve outcomes for those suffering from arthritis. This information will be a unique resource for researchers and caregivers in Nebraska and elsewhere. The NAORC was established in 2007 through a generous donation by Ruth and Bill Scott, strong supporters of the Department of Orthopaedic Surgery and Rehabilitation and UNMC.

LAB WORKSHOPS AND EDUCATIONAL SESSIONS

The department offers cadaver lab research projects and educational sessions for residents and faculty members on an ongoing basis. These projects, made possible by generous anatomical donations, allow surgeons to develop, practice and refine leading-edge techniques that benefit living patients without any additional risk. These dynamic surgical workshops are invaluable to not only our departmental faculty and residents, but often other physicians throughout the region as well. The following list includes lab workshops hosted during the 2014 and 2015 calendar years, and early in 2016:

Lab Workshops 2014-2016

- Dr. Matthew Teusink
(Resident teaching: Rotator Cuff Reconstruction and Elbow Arthroplasty)
- Dr. Matthew Mormino
(Resident teaching: Compartment Pressure Checks, Leg Compartment Releases)
- Dr. Matthew Teusink
(Resident teaching: Elbow Arthroscopy and Surgical Approaches)
- Dr. Lori Reed and Dr. Curtis Hartman
(Clinical Practice: Hip Arthroscopy Approaches)
- Dr. Kevin Garvin
(Clinical practice and Resident Education: Periacetabular osteotomy)
- Dr. Philipp Streubel
(Wrist dissection bilateral: Photos taken for manuscript submission)
- Dr. Matthew Teusink
(Elbow surgery – clinical practice and resident teaching)
- Dr. Matthew Teusink
(Elbow surgery – clinical practice and resident teaching)
- Dr. Matthew Mormino
(Hip Wire Navigation [Mock OR vs. Simulator]) (How best the first year resident learns [University of Iowa researchers and five first year UNMC Ortho Residents])

GRANTS, FUNDS & ENDOWMENTS

The department's mission depends upon effective integration of cutting-edge scientific research, superior medical education and state-of-the-art patient care. Grants, funds and endowments are essential to our ongoing success with linking these three functions to achieve continued growth.

RESEARCH GRANTS

The Department of Orthopaedic Surgery and Rehabilitation research program has earned national and international attention and accolades. Departmental faculty members conduct research in basic science, biomedical engineering, computer simulation and nano-biotechnology, in addition to clinical outcomes studies. Advances in the diagnosis, care, and prevention of diseases require years of careful scientific research. By combining outside resources and our insights, we continue to be able to offer the most advanced diagnoses and surgical treatments for our patients.

The following list includes the names, sources and funding of grants received by the Department of Orthopaedic Surgery's faculty members during the 2014 and 2015 calendar years, and in early 2016:

Industry

2014	Exponent - An in-vitro wear durability study of the Stelkast knee systems, comparing two bearing material types under abrasive conditions	\$ 34,999
	Exponent - A simulator wear study of ceramic-on-plastic total hip replacement systems from Japan comparing differently processed polymer bearings	\$ 157,500
2015	Biomet - Extension of a study for the wear of a prototype hinged total knee replacement system	\$ 65,000
	Lima Corp - A simulator wear study of duo-mobility total hip replacement systems	\$ 90,000
	Biomet - A simulator Study of the Wear of Biomet Hinged Total Knee Replacement Bearing Components	\$ 72,000
	Arthrex - In-vitro Durability Study of the Arthrex PS Knee System in Abrasive and Non-abrasive Conditions and Femoral Scratching Test	\$ 180,000
	Amedica - Comparative Testing of Ceramic Femoral Heads for Total Hip Arthroplasty (Amedica Phase I)	\$ 190,000
	Arthrex - An In-vitro Wear Durability Study of the iBalance Unicompartmental Knee System with Vit. E stabilized Highly Cross-Linked Bearings	\$ 60,000

Clinical Trials

2014	Pfizer - Descriptive Analysis of the Effect of Surgeries on Human Immune Status	\$ 1,045,132
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Other

2014	UNMC Cardiology - AngioTeacher Interactive Educational Software	\$ 75,000
2015	NYUM - Experimental Study of Wear Durability of a Novel Unicompartmental Knee Replacement Design, Comparing Standard & Reverse Material Bearing Couples	\$ 65,000
	Registry for Orthopaedic Trauma in Children (ROTC)	\$ 3,500
2016	NYUM - Wear of Total Knee-Joint Prostheses	\$ 75,000

ENDOWMENTS AND DONATIONS

Endowments provide much-needed perpetual resources for a variety of departmental education and research activities. When an endowed fund is established through the University of Nebraska Foundation to benefit the Department of Orthopaedic Surgery and Rehabilitation, the principal of the fund is invested and a portion of the earnings support assistantships, resident education, equipment and technology purchases, library resources, research project seed money, faculty chairmanships and much more, depending upon the donors' interests.

The department also maintains several non-endowed funds at the University of Nebraska Foundation. Our Development Fund is an unrestricted resource that provides valuable, flexible resources to make various resident- and faculty-related projects possible. This fund is used primarily for resident activities, including supporting those who present research at national meetings, bringing in visiting speakers and making graduation a memorable celebration. Over the years, other funds have also been established for various purposes.

The following is a list of currently active endowed and non-endowed funds that have been established or pledged to the department since its inception:

Dr. H. Winnett Orr Endowment for Orthopedic Research and Teaching Fund

Research and teaching supplies and materials

Chapin Endowment Research Fund

Osteoporosis research support

Frank P. Stone Professorship of Orthopaedic Surgery

Faculty support/professorship

Jean Brug Jardon Endowment Fund

Resident's library and teaching resources

Orthopaedic Surgery Department Development Fund

Robert C. Hendler, M.D., Fund

Center for Excellence in Muscular Skeletal Diseases

James R. Neff, M.D., Children's Orthopaedic Cancer and Molecular Genetics Fund

Orthopaedic surgery and rehabilitation

Dr. Foster Matchett Research Assistantships

Research assistantships

Robert G. Volz, M.D., Research Fund

Research and education

Dr. Richard and Kathryn Pettee Orthopaedic Excellence Fund

Academic research

Christina M. Hixson Endowment

Sub-fund for Research in Orthopaedic Surgery and Rehabilitation Medicine

Wayne and Eileen Ryan Orthopaedic Research Development Fund

Research, education and clinic activities

Jackson Bence, M.D., Education and Research Fund

Resident education, research and related activities

L. Thomas Hood, M.D., and Herman Frank Johnson, M.D., Excellence Fund

Faculty support/professorship

L. Thomas Hood, M.D., Professorship of Orthopaedic Surgery and Rehabilitation

Faculty support/professorship

Herman Frank Johnson, M.D., Professorship of Orthopaedic Surgery and Rehabilitation

Faculty support/professorship

James R. Neff, M.D., Musculoskeletal Fund

Establishment of James R. Neff, M.D. Chair of Musculoskeletal Oncology

Orthopaedic Oncology Research Development Fund

Oncology research support

John F. Connolly Resident Excellence Fund

Resident fund

Orthopaedics Research and Education Fund

Benefit and support of faculty and resident research and education

UNMC Orthopaedics Excellence Fund

Equipment and other capital needs

Operation Walk Nebraska Fund

Faculty outreach activities

James R. Neff Research Fund

Benefit and support of research

Harold and Marian Andersen Lectureship for Orthopaedic Surgery

Establishment of annual lectureship to support non-orthopaedic graduation speaker

Orthopaedic Surgery Resident Support Fund

Benefit and support of residents

Bill and Ruth Scott, The Nebraska Arthritis Outcomes Research Center (NAORC)

Establishment, benefit and support of the Nebraska Arthritis Outcomes Research Center

TOTAL ENDOWMENTS
& DONATIONS
\$17,000,000

FEATURED DONORS



RUTH & BILL SCOTT

Ruth and Bill Scott are deeply rooted and invested in the Omaha community, where they have lived for more than 55 years. The contribute to the city's health, vitality and advancement in quiet, but extraordinary ways. Over the past decade, the Scotts have made multiple gifts to UNMC, including lead gifts on several new buildings for the UNMC Colleges of Medicine, Nursing, Public Health and Pharmacy.

In particular, the Scotts have generously supported the Department of Orthopaedic Surgery and Rehabilitation, including a gift that enabled the creation of Nebraska Arthritis Center for Outcomes Research, to conduct studies which will provide a better understanding of the epidemiology of arthritis and to better analyze the determinants which predict outcomes for arthritis sufferers. Established in 2007, the center is directed by Kevin Garvin, M.D., and James O'Dell, M.D., professor, internal medicine, and chief of the rheumatology & immunology section. Additionally, they supported Dr. Garvin in his efforts to create an orthopedic surgery research laboratory at the Peter Kiewit Institute.

Thanks to another generous gift from Ruth and Bill Scott, the Department of Orthopaedic Surgery and Rehabilitation moved to the new Lauritzen Outpatient Center in late 2016. The Scotts supported the new orthopaedic research and educational spaces on the building's fourth floor, along with a new UNMC telemedicine center. Their contribution to the Lauritzen Outpatient Center will bring the department's surgeons, researchers, residents and staff together in closer working proximity – strengthening the department's ability to further our tripartite mission of patient care, education and research.

"We believe so strongly in UNMC's leadership and that of Dr. Kevin Garvin and the Department of Orthopaedic Surgery and Rehabilitation," said Ruth Scott. "Our family has personally benefited from their expertise, and we want to help ensure this quality of care continues through extraordinary research and education. We also support Dr. [Jeffrey P.] Gold's vision for advancing telemedicine and the tremendous benefits it will bring to Nebraskans across the state."

CHRISTINA M. HIXSON ENDOWMENT



Christina Hixson likes to plant seeds of support and watch what grows. Thanks to those 'seeds' the Department of Orthopaedic Surgery & Rehabilitation has produced more than a decade of breakthroughs in research and education – and ensured that more world-class advancements will be achieved here in the future.

The Christina M. Hixson Endowed Research Fund for Orthopaedic Surgery and Rehabilitation was established at the University of Nebraska Foundation in 2001, through the Lied Foundation Trust. The fund is a permanent endowment from which a portion of the annual earnings will support various research projects essential to the advancement of orthopaedic medicine at UNMC. Resulting studies have generated great interest in, and additional funding for, the department's biomechanics laboratory. In December 2012, Hixson made another substantial gift for ongoing research and orthopaedic resident education.

"What Ms. Hixson has accomplished as the sole trustee of the Lied Foundation Trust is truly amazing," said Kevin L. Garvin, M.D., who first met Hixson as an arthritis patient, more than 15 years ago. "She has created a far-reaching legacy, well beyond the orthopaedic department, the University of Nebraska, and even the state of Nebraska. She has exceptional philanthropic vision, and how she brought that vision to fruition is an inspiring story we want to share. We cannot thank her enough for her support."

Hixson moved to Omaha at age 17, and soon began working at an Omaha car dealership owned by Ernst Lied. Over the next 40 years, her responsibilities and his entrepreneurial interests grew; though business took Lied to Las Vegas, Nevada, he always considered Nebraska "home." When he died in 1980, Hixson was named the sole trustee of the Lied Foundation Trust.

In a video produced by the University of Nebraska Foundation in 2012, Hixson discussed her role with the trust, which has now funded more than \$300 million in charitable projects: "When [Mr. Lied] passed away, we didn't have any money; we had all this land. I must have had an angel on my shoulder because I sold that land and invested in people...You can't forget, this is really Lied who gave everything he had to the general public."

HAROLD AND MARIAN ANDERSEN LECTURESHIP FOR ORTHOPAEDIC SURGERY



Harold and Marian Andersen have been longtime supporters of the Department of Orthopaedic Surgery and Rehabilitation and the University of Nebraska, as alumni, patients and donors. After several months of declining health, Mr. Andersen died in December 2015 at the age of 92. His legacy at UNMC lives on through the Harold and Marian Andersen Lectureship for Orthopaedic Surgery. Established in 2012, the Lectureship allows the department to bring a non-orthopaedic speaker to the department's resident graduation ceremonies each year. The Lectureship focuses on "non-scientific issues that enhance the education, diverse interests and community involvement of faculty and residents."

The witty Mr. Harold Andersen, himself – a former publisher of the Omaha World-Herald – personally gave the inaugural lecture in 2012, and again in 2014. Since then, the Harold and Marian Andersen Lecture has been given by Clayton C. Anderson, a retired NASA astronaut (2013); Thomas Wilkins, music director of the Omaha Symphony (2015); and Dara Torres, former Olympic swimmer and 12-time Olympic medalist (2016).

CONTRIBUTORS HONOR ROLL

Private contributions make a significant difference in the day-to-day educational opportunities, research, and clinical care proudly provided by the Department of Orthopaedic Surgery and Rehabilitation. Generous gifts from alumni, friends, foundations, corporations and faculty support various departmental programs that may not otherwise be possible. Some choose to contribute to our department-wide Development Fund, which is primarily dedicated to resident education, while others specify their gifts be applied to scholarships, research, library resources, laboratory equipment or other resources.

This honor roll alphabetically lists the names of individuals and organizations that supported the department during the 2014 and 2015 calendar years. Those who have made donations in 2016 will be recognized in the next biennial report and in issues of our department newsletter, Breaking News.

\$10,000 and up

Dr. Chris Cornett
Dr. Mark Dietrich
Dr. and Mrs. Paul J. Duwelius
Dr. Paul Esposito
Dr. Kevin Garvin
Dr. and Mrs. Roy J. Guse
Dr. Curtis Hartman
Dr. Brian Hasley
Mrs. L. Thomas Hood
Dr. M. Layne Jenson
Wayne L. Ryan, Ph.D.
Ruth & Bill Scott
Dr. Justin Siebler
Dr. Philipp Streubel
Dr. Matthew Teusink

\$5,000-9,999

Marian L. Andersen
Bryan D. Bredthauer M.D. and Ms.
Gertrude A. Bredthauer
Bryan D. Bredthauer, M.D., P.C.
Dr. Miguel Daccarett
Dr. Beau Konigsberg
Dr. Sean McGarry
Dr. Matthew Mormino
Dr. Susan Scherl

\$1,000-4,999

Dr. and Mrs. Kirk D. Green
Dr. and Mrs. R. Michael Mendlick
Dr. John A. Miyano
Dr. and Mrs. Jeffrey S. Moore
Jeffrey & Nancy Tiedeman
Dr. David A. & DuAnn Peterson
Raymond James Charitable
Endowment Fund
Robert J. Tait, M.D., P.C.
Dr. Robert J. Tait
Dr. & Mrs. Michael J. Sicuranza

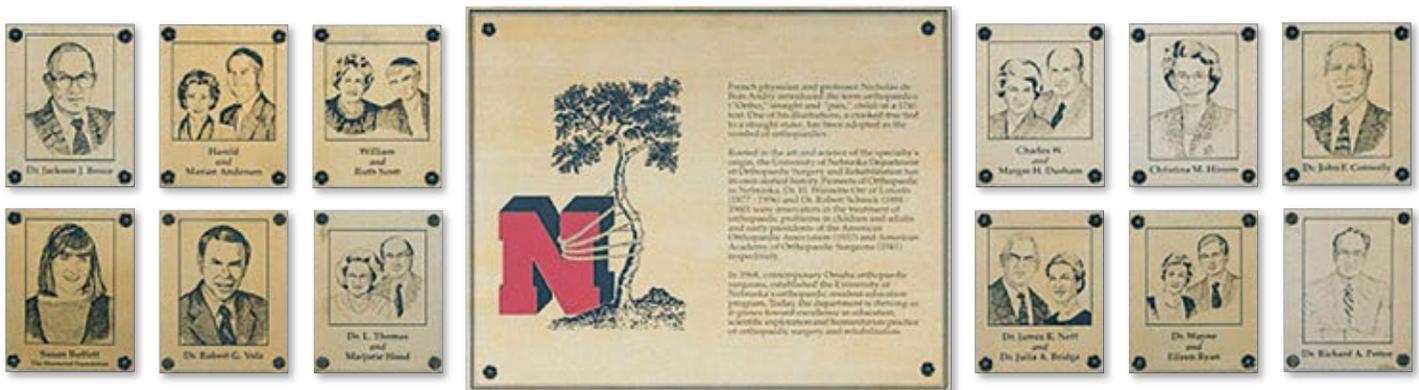
\$0-999

Dr. and Mrs. Jeffrey M. Farber
Dr. Annie Knierim, M.D.
Mrs. Mary Oba
OSS Health
James Scott-Miller, M.D.

The Department of Orthopaedic Surgery and Rehabilitation's faculty, residents and staff sincerely thank you for your generosity and support. If you have a question or concern related to this Honor Roll of Contributors, please contact the University of Nebraska Foundation's Omaha office, located at 2285 South 67th Street, Suite 200, Omaha, NE 68106, or call 402-502-0300.

WALL OF HONOR

HONORED ARE THOSE WHOSE GENEROSITY HAS BENEFITED THE DEPARTMENT OF ORTHOPAEDIC SURGERY AND REHABILITATION



Top row, left to right:
Dr. Jackson J. Bence
Harold and Marian Andersen
William and Ruth Scott
Charles W. And Margre H. Durham
Christina M. Hixson
Dr. John F. Connolly

Bottom Row, Left to Right:
Susan Buffett (The Sherwood Foundation)
Dr. Robert G. Volz
Dr. L. Thomas and Marjorie Hood
Dr. James R. Neff and Dr. Julia A. Bridge
Dr. Wayne and Eileen Ryan
Dr. Richard A. Pettee

The Department of Orthopaedic Surgery and Rehabilitation’s Wall of Honor permanently recognizes the remarkable individuals and organizations whose generosity has benefited departmental research, education and patient care.

The Wall of Honor was installed in 2003. A series of brushed metal plaques feature the names and etched portraits of donors who have given \$100,000 or more in support of the department’s mission. A brief history of Nebraska’s orthopaedic program, rooted in the art and science of the field, appears in the plaque’s center.

French physician and professor Nicholas de Bois Andry introduced the term “orthopaedics” in a 1741 text, along with an illustration of a crooked tree anchored to a straight stake. This image became a universal symbol for orthopaedics and an important element of the department’s identity.

In Nebraska, Dr. H. Winnette Orr (1877-1956) and Dr. Robert Schrock (1884-1960) were pioneers in the field. Leading innovators for the treatment of musculoskeletal disorders in children and adults, they were also early presidents of the American Orthopaedic Association (1937) and American Academy of Orthopaedic Surgeons (1941), respectively.

Contemporary Omaha surgeons established the University of Nebraska orthopaedic resident education program in 1968. Today, the department continues to thrive and reach new milestones of outstanding medical education, scientific exploration and humanitarian care.

MEET OUR RESIDENTS

CLASS OF 2017

Paul Johnson, M.D.

- Hometown: Brookfield, WI
- College: Creighton University
- Medical School: Medical College of Wisconsin

Courtney Grimsrud, M.D.

- Hometown: Sisseton, SD
- College: South Dakota State University
- Medical School: Sanford School of Medicine at the University of South Dakota

Eric Bonness, M.D.

- Hometown: Omaha, NE
- College: University of Nebraska-Lincoln
- Medical School: University of Nebraska Medical Center

Andrew Kirkpatrick, M.D.

- Hometown: Appleton, WI
- College: University of Wisconsin – Stevens Point
- Medical School: Medical College of Wisconsin



CLASS OF 2018

Leonid (Lenny) Grossman, M.D.

- Hometown: St. Louis, MO
- College: Saint Louis University (Undergraduate & Graduate)
- Medical School: Creighton University School of Medicine

Sayfe Jassim, M.D.

- Hometown: Sioux Falls, SD
- College: University of Minnesota
- Medical School: Sanford School of Medicine at the University of South Dakota

Benjamin Ogden, M.D.

- Hometown: Ogden, UT
- College: Weber State University
- Medical School: University of Virginia

Noah Porter, M.D.

- Hometown: Omaha, NE
- College: Nebraska Wesleyan University
- Medical School: Creighton University School of Medicine



CLASS OF 2019

Todd Gilbert, M.D.

- Hometown: Ogden, UT
- College: Weber State University
- Medical School: Virginia Commonwealth University

Tyler Larson, M.D.

- Hometown: Rochester, MN
- College: University of Minnesota Duluth
- Medical School: University of North Dakota

Eric Bowman, M.D.

- Hometown: Memphis, TN
- College: University of Tennessee
- Medical School: University of Tennessee Health Science Center

Ryan Miller, M.D.

- Hometown: Fullerton, CA
- College: University of California, Irvine
- Medical School: Creighton University School of Medicine



CLASS OF 2020

Emmett Gannon, M.D.

- Hometown: Kearney, NE
- College: University of Nebraska at Kearney
- Medical School: University of Nebraska Medical Center

Joshua Locker, M.D.

- Hometown: Orange City, IA
- College: Northwestern College
- Medical School: University of Iowa Carver College of Medicine

Daniel Sveom, M.D.

- Hometown: Staples, MN
- College: Wartburg College
- Medical School: University of Minnesota Medical School

Darin Larson, M.D.

- Hometown: Vincent, IA
- College: University of Iowa
- Medical School: University of Iowa Carver College of Medicine

Evan Larson, M.D.

- Hometown: Bode, IA
- College: University of Iowa
- Medical School: University of Iowa Carver College of Medicine



CLASS OF 2021

Kent Rinehart, M.D.

- Hometown: Knoxville, TN
- College: University of Tennessee
- Medical School: East Tennessee State University Quillen College of Medicine

Phillip Thomas, M.D.

- Hometown: Hemingford, NE/Denver, CO
- College: Saint Mary's University of Minnesota
- Medical School: University of Minnesota Twin Cities

Christopher Deans, M.D.

- Hometown: Hemingford, NE/Denver, CO
- College: University of Northern Colorado and University of Nebraska-Kearney
- Medical School: University of Nebraska Medical Center

David Kusin, M.D.

- Hometown: Houston, TX
- College: Yeshiva University
- Medical School: Case Western Reserve University

Josh Cameron, M.D.

- Hometown: Midwest City, Oklahoma
- College: University of Oklahoma
- Medical School: University of Oklahoma Health Sciences Center



RECENT POST-GRADUATE FELLOWSHIPS AND PRACTICES

CLASS OF 2015

Todd J. Gaddie, M.D.

- Hand Surgery Fellowship,
Tufts Medical Center
Boston, MA

Gregory G. Dammann, M.D.

- Freeport Health Network
Freeport, IL

Andrew J. Taiber, M.D.

- Hand and Upper Extremity Fellowship,
Vanderbilt University School Of Medicine
Nashville, TN

Brent R. Hood, D.O.

- Hastings Orthopaedic Surgery
and Sports Medicine
Hastings, NE



CLASS OF 2016



Paul S. Hong, M.D.

- Spine Surgery Fellowship,
University of Pittsburgh Medical Center
Pittsburgh, PA

Paul J. Nielsen, M.D.

- Hand Surgery Fellowship,
Indiana Hand to Shoulder Center
Indianapolis, IN

Kaitlin C. Neary, M.D.

- Foot and Ankle Fellowship,
U.C. Davis/Reno Orthopaedic Clinic
Sacramento, CA and Reno/Tahoe, NV

Scott Vincent, M.D.

- Spine Surgery Fellowship,
University of Wisconsin School of Medicine
Madison, WI

EDUCATING THE NEXT GENERATION

THE NEBRASKA ORTHOPAEDIC RESIDENCY TRAINING PROGRAM

In the 45 years since UNMC sent its first newly-trained orthopaedic surgeon out into the world, the residency program in the Department of Orthopaedic Surgery and Rehabilitation has transformed into one of the top programs in the country. The department started out with just one resident in 1971 and has grown to 22 budding orthopaedic surgeons in 2016, all of whom come from exceptional medical school backgrounds and are poised to become the best and brightest in the field of orthopaedics.

Life as an orthopaedic resident is a rigorous, but rewarding experience. Each day, the residents at UNMC can be found actively caring for patients, consulting on diagnoses and treatment plans, assisting in the operating room and conducting important research. They spend five years of their lives in Omaha, undergoing intense training in each of the nine orthopaedic subspecialties:

- hand and upper extremity
- foot and ankle
- major joint reconstruction
- oncology
- pediatric orthopaedic surgery
- shoulder and elbow
- spine
- sports medicine
- trauma

The Nebraska Orthopaedic Residency Training Program partners closely with Nebraska Medicine, a Level I trauma center, and the state's largest and highest rated hospital. Through this partnership, orthopaedic surgery residents are often the first physicians called to the emergency department in the event of a patient trauma in Omaha or the surrounding community.

Residents also benefit from the program's affiliation with Children's Hospital & Medical Center, Omaha VA Medical Center, Nebraska Orthopaedic Hospital and Bergan Mercy Medical Center.

The program received full accreditation by the Residency Review Committee of the Accreditation Council for Graduate Medical Education (ACGME) in January 2009 and is aligned with the American Academy of Orthopaedic Surgeons (AAOS) requirements. UNMC's residency curriculum addresses the six core competencies: patient care, interpersonal and communication skills, professionalism, medical knowledge, systems-based practice and practice-based learning and improvement.

Nineteen full-time clinical and research faculty and numerous staff members are closely involved in every aspect of resident education. These educators instruct, evaluate and mentor residents throughout their tenure at UNMC. Full-time lab technicians and a clinical research coordinator also step in to assist with required research projects. Part-time and volunteer faculty members from the Omaha area provide additional educational opportunities as residents explore the various options open to them as orthopaedic surgeons.

Early on in their training, residents are also exposed subspecialty private practice environments, where they can get a feel for providing care as a private practitioner, in addition to their robust training in academic medicine.

The Nebraska Orthopaedic Residency Training Program is directed by Matthew Mormino, M.D., professor of orthopaedic surgery at UNMC. Omaha's metropolitan area is home to nearly 900,000 people and counting, and offers residents the chance to receive an outstanding educational experience while living in a safe town with affordable living and an enriched social environment. As such, many of UNMC's residents eventually go on to build their orthopaedic practices in Nebraska and the Midwest.



UNMC ORTHOPAEDICS RAISES THE EDUCATIONAL BAR

The Accreditation Council for Graduate Medical Education (ACGME) accepted the department's request for an increased number of residents beginning in 2015

For the first time in over three decades, the UNMC Department of Orthopaedic Surgery and Rehabilitation welcomed five new residents to the program in July 2015. Historically, the program has accepted four new residents each year, but as the department's faculty and research capacity has grown, professor and chair Kevin Garvin, M.D., and residency program director Matthew Mormino, M.D., decided it was time to make a change.

"Our department has tripled in size over the past 15 years, which has increased the opportunities for resident education," Dr. Mormino said. "That, combined with a national need for more orthopaedic surgeons made this an ideal time to increase our number of resident physicians."

The department currently boasts 19 full-time orthopaedic surgeons and clinician scientists. Among these physicians are recently-hired faculty members that specialize in hand and upper extremity, sports medicine, trauma, pediatric and spine surgery. Our roster of dedicated educators offers greater learning opportunities for residents.

"With more and varied surgical cases, our residents will have access to a well-rounded educational experience," Dr. Mormino said.

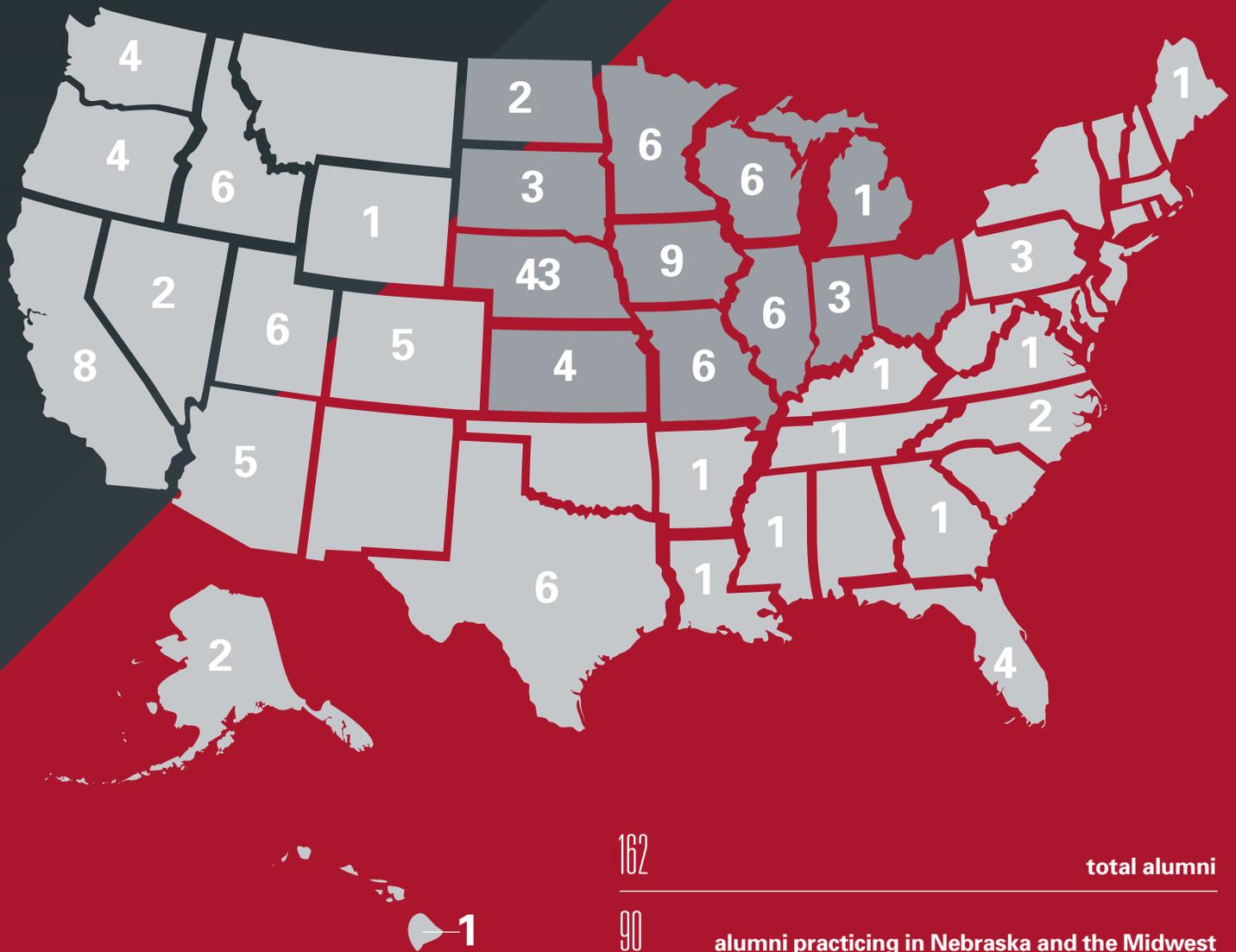
UNMC orthopaedic residents have the added advantage of a successful research team. A robust research program only enhances residents' knowledge of the basic science of orthopaedics, which in turn, teaches them to become lifelong learners and exceptional surgeons.

Similarly, UNMC's clinical simulation lab, the expansion of Nebraska Medicine's clinical practices and a 40 percent increase in trauma admissions all provide additional opportunities for residents to have earlier and greater exposure to all facets of orthopaedic surgery.

The increase will have a significant effect on the basic structure of the program. Residents will now be able to spend more time in several subspecialty areas. For example, residents will participate in a newly-formed PGY-2 with a primary focus on orthopaedic oncology and an extra ten weeks of pediatric orthopaedics. PGY-3 and PGY-4 residents will now spend time at the new sports service at the Nebraska Orthopaedic Hospital. An additional PGY-5 rotation will give residents training in trauma services with the department's three trauma surgeons.

Orthopaedic faculty have always focused on residents as learners rather than service providers. That belief has propelled the program forward over the past three decades and will continue to do so in the future. There is no doubt about it: The educational bar for orthopaedic residents has been raised, and the department is up to the challenge.

We are proud that more than half of the men and women who have completed their orthopaedic residency training through UNMC have continued their careers in Nebraska or the Midwest. The remaining physicians are practicing around the country and overseas, and many have gone on to become educators themselves, passing on their superior skills and knowledge to the next generation of physicians. Doctors throughout the region regard UNMC as a source of continuing education where they can learn the latest techniques for diagnosis, treatment, and prevention of bone and joint diseases.



NEBRASKA ORTHOPAEDIC ALUMNI

The following is a list of all department alumni since the orthopaedic residency program was established in 1971.

NAME	STATE	YEAR	NAME	STATE	YEAR	NAME	STATE	YEAR
Lowell Niebaum	NV	1971	Bryan Bredthauer	NE	1990	Jason Browdy	MO	2003
Dale Phelps*		1972	Kevin O'Malley	NE	1990	Joshua Urban	NE	2003
Oscar Jardon*		1972	Michael Sicuranza	PA	1990	Richard Davis	ID	2004
Carl Schwartz	AK	1973	Roy Guse	TX	1990	Stephen Hansen	ID	2004
William Smith	NE	1973	Douglas Beard	CO	1991	Lori Reed	MS	2004
John Kaufman	CA	1974	Teri Formanek	IA	1991	Brian Hasley	NE	2004
Richard Bergstrom	NE	1974	Bret Miller	IL	1991	Scott Humphrey	ID	2005
Robert Staver	OR	1974	Mark Goebel	NE	1991	Ivan Tarkin	PA	2005
Ronald Boulware	TX	1974	Jeffrey Moore	AK	1992	Edward Prince	UT	2005
Robert Cochran, II	NE	1975	David Thull	AZ	1992	Anthony Lauder	WA	2005
James Kullbom	SD	1975	Thomas Walsh	MN	1992	Daniel Mulconrey	IL	2006
Richard Wecker	WY	1975	Jeffrey Tiedeman	NE	1992	Mark Dietrich	NE	2006
Floyd Pohlman	HI	1976	Todd Kile	AZ	1993	Kathleen Grier	NE	2006
Jack Brindley	IA	1977	Jeffrey Davick	IA	1993	Charles Rosipal	NE	2006
Eric Bugna	CA	1978	Eric Gordon	MO	1993	Steven Volin	NE	2006
Neil Halbridge	CA	1978	Ted Yee	CA	1994	David Buck	NE	2007
William Boulden	IA	1978	Scott Beck	FL	1994	Beau Konigsberg	NE	2007
Ronald Schwab	NE	1979	James Hill	IL	1994	Scott Swanson	NE	2007
John Yeakley	NE	1979	Scott McMullen	NE	1994	Kimberly Turman	NE	2007
Jasper Williams	WI	1979	Robert Tait	NV	1994	Michael Hawks	FL	2008
Samar Ray	NE	1980	Robert Mileski	AZ	1995	Randon Johnson	IL	2008
Barry Turner	NE	1980	Vern Prochaska	ND	1995	Curtis Hartman	NE	2008
Alois Proett	WI	1980	Deepak Chavda	TX	1995	Leonard Kibuule	TX	2008
Joel Adams	ME	1981	Clay Frank	WI	1995	Brian Kleiber	MO	2009
Edward Simodynes*		1981	Jeffrey Rodgers	IA	1996	Justin Siebler	NE	2009
Ram Pankaj	IL	1982	Matthew Mormino	NE	1996	Casey Johnston	SD	2009
Donald Walla	NE	1982	Julian Arroyo	WA	1996	Erica Burns	WA	2009
Gurpal Bhuller	VA	1982	John Miyano	WA	1996	Gustavo Cordero	CA	2010
Gary Porubsky	LA	1983	David Castro	CA	1997	Michael Shevlin	ID	2010
Randall Neumann	NE	1983	Khiem Dao	CA	1997	Kurt Bormann	MO	2010
Michael Schmidt	KS	1984	Keith Hughes	NE	1997	Ryan Arnold	NE	2010
Mark Secor	KY	1984	Steven Kumagai	NE	1997	Jason Erpelding	ND	2011
Christeen Kaga	NC	1984	Michael Sochacki	AZ	1998	Daniel Firestone	NE	2011
Mark Buchman	NE	1984	Charles Burt	NE	1998	Michael Carlson	UT	2011
Gregg Taylor	WI	1984	Brett Fischer	NE	1998	Michael Dee	UT	2011
John Kelbel	IN	1985	John McClellan, III	NE	1998	Nicholas Aberle, II	KS	2012
Robert Hansen	UT	1985	Jeffrey Zacharias	MI	1999	Ryan Hess	MN	2012
Scott Smith	UT	1985	Daniel Hoeffel	MN	1999	Lucas Burton	TN	2012
Joseph Yao	AR	1986	Stanley Bowling	MO	1999	Brian Vernon	UT	2012
Larry Chidgey	FL	1986	Erik Otterberg	NE	1999	Jeremy Toomey	ID	2013
F. Stig Jacobsen	MN	1986	Brian Brigman	NC	2000	Ann Knierim	NE	2013
Thomas Eastman	TX	1986	Edward Fehringer	NE	2000	Nolan May	NE	2013
Lewis Oster, Jr.	CO	1987	Eric Watson	SD	2000	Eric Samuelson	NE	2013
Kirk Green	IA	1987	John Schneider	WI	2000	Khalid Azzam	IN	2014
David Peterson	KS	1987	Armодios Hatzidakis	CO	2001	Kevin Lindgren	MN	2014
Paul Duweliu	OR	1987	Michael Clare	FL	2001	David Minges	MO	2014
Richard Shindell	AZ	1988	Craig Mahoney	IA	2001	Gregory Dammann	IL	2015
Jeffrey Farber	IA	1988	Aaron Askew	OR	2001	Todd Gaddie	NE	2015
Marcia Beckman-Nelsen**		1988	Douglas McInnis	ID	2002	Brent Hood	NE	2015
Gregory Hansen*		1988	David Inda	NE	2002	Andrew Taiber	IA	2015
Jan Davis	CO	1989	Michael Thompson	NE	2002	Kaitlin Neary	CA	2016
Samuel Smith	CO	1989	James Ballard	OR	2002	Paul Nielsen	IN	2016
Lynn Crosby	GA	1989	John Sojka	KS	2003	Scott Vincent	WI	2016
Robert Dehne	TX	1989	Kristoffer Breien	MN	2003	Paul Hong	PA	2016

*Deceased **Unable to contact

2014-2016 VISITING SPEAKERS

The Department of Orthopaedic Surgery and Rehabilitation hosts speakers from around the region, country and world to engage faculty, residents, staff and peers. By sharing their knowledge and expertise in a variety of disciplines, these visitors enhance the lifelong educational experience fostered by UNMC and the department.

These guest presentations are made possible by generous contributions to the department's Development Fund from alumni and supporters. This support allows us to continue bringing visiting speakers that offer new and innovative ideas in surgical techniques, research topics and patient care.

The following list includes those who presented to the department from 2014-2016.

February 2014

- 3 Julie Fedderson, M.D.**
Assistant Professor, UNMC Department of Internal Medicine
"Clinical Documentation Excellence for Orthopaedic Surgeons"

March 2014

- 2 Kim Apker, M.D.**
Associate Professor, UNMC Department of Radiology
"MRI of the Knee"
- 24 Fred Durden, M.D.**
Assistant Professor, UNMC Plastic and Reconstructive Surgery
"Soft Tissue Coverage in Extremity Trauma"
- 31 Paul Paulman, M.D.**
Professor, UNMC Department of Family Medicine
Assistant Dean, UNMC Clinical Skills and Quality
"Role of Simulation in Medical Education and Surgical Training"

April 2014

- 3 Adam Reinhardt, M.D.**
Rheumatology, Children's Hospital & Medical Center, Omaha, NE
"JIA"
- 4 Julie Fedderson, M.D.**
Assistant Professor, UNMC Department of Internal Medicine
Quality/Outcomes Officer, Clinical Enterprise
"ICD-10"
- 14 Nicholas Bruggeman, M.D.**
Nebraska Orthopaedic Associates, LLP, Omaha, NE
"CMC Arthroplasty"
- 21 Todd Milbrandt, M.D.**
University of Kentucky Health Center Orthopaedics, Lexington, KY
"Translational Research in Pediatric Orthopaedics"

May 2014

- 16 James Devney, M.D.**
Spine & Musculoskeletal Medicine, Omaha, NE
"Non-surgical Treatment Modalities for Musculoskeletal Pain (injections, nerve blocks, etc.)"

June 2014

- 16 Association of Southeast Asian Nations (ASEAN) Traveling Fellows Presentations**
- Dr. Chia-Liang Ang:**
"Minimally Invasive Compared with Open Lumbar Laminotomy: No Functional Benefits at 60 or 24 Months after Surgery"
- Dr. Hein Latt Win:**
"Chinese Experience with Metal-on-metal Hip Resurfacing"
- Dr. Istan Irmansyah Irsan:**
"The Effect of CaCl₂ Added Platelet Rich Plasma to the Healing Time, Tensile Strength and Adhesion Degree of the Ruptured Tendinopathic Achilles Tendon In Vivo"
- Dr. Azura Mansor:**
"Primary Bone Lymphoma: A Case Series Study"

- 18 Peter Smith, M.D.**
Chicago Shriner's Hospital and Rush Medical College, Chicago, IL
"Clubfoot"

27-28 Graduation Ceremonies

- Andrew Dudley, Ph.D.**
Associate Professor, UNMC Genetics, Cell Biology and Anatomy
"Developmental Trajectory-based Tissue Engineering of Cartilage"
- Sarah Romereim, B.S.**
Graduate Student, UNMC Genetics, Cell Biology and Anatomy

"Physiochemical Mechanisms of Cartilage Growth and Morphogenesis"

Daniel Sucato, M.D., M.S.
Professor, Department of Orthopaedic Surgery, University of Texas Southwestern Medical Center at Dallas

"Hip Preservation in the Adolescent and You" and "Management of Complex Spinal Deformity"

Harold Andersen
Former Publisher of the Omaha World-Herald; Past President of the American Newspaper Publishers Association, Omaha, NE

"International Experience as President of the International Federation of Newspaper Publishers"

November 2014

- 21 Resident Research Symposium**
- J. Tracy Watson, M.D.**
Professor of Orthopaedic Traumatology, St. Louis University School of Medicine, St. Louis, MO
"From Protractor Guesswork... To Digitally Assisted Correction... Deformity Assessment and Treatment with External Fixation"

January 2015

- 12 Rusty McKune, ATC**
Sports Medicine Program Coordinator, Nebraska Medicine, Omaha, NE
"Concussions - Evaluation and Return to Play"
- 26 Steven Wengel, M.D.**
Professor, UNMC Department of Psychiatry
"Stress in Medicine"

February 2015

- 9 Kim Apker, M.D.**
Associate Professor, UNMC Department of Radiology
"Ankle MRI"

June 2015

- 1** **Nicholas Bruggeman, M.D.**
OrthoWest, Omaha, NE
"Scaphoid Fractures"
- 8** **Annie Knierim, M.D.**
CHI Health ALEGENT Creighton Clinic, Omaha, NE
"Talus Fractures"
- 12-13** **Graduation Ceremonies**
- H. Claude Sagi, M.D.**
Associate Clinical Professor, Department of Orthopaedic Surgery, University of South Florida, Tampa, FL
"The Changing Paradigm of Open Fracture Treatment" and "The Theory of Relativity as it Relates to Pelvic Fracture Treatment"
- Thomas Wilkins**
Music Director, Omaha Symphony, Omaha, NE
"The Best of Us for the Rest of Us"

July 2015

- 30** **Richard Lorio, M.D.**
Chief of Orthopaedic Surgery, NYU Langone Medical Center
"Preventing Hospital Readmissions Associated with Total Joint Arthroplasty"

August 2015

- 17** **Jason Shiffermiller, M.D.**
Assistant Professor, UNMC Internal Medicine
"Perioperative Medical Management of Orthopaedic Patients"

September 2015

- 28** **Scott Pepin, M.D.**
Sports Medicine Fellow, OrthoIndy
"Straight tibial tuberosity anteriorization in patients with normal tuberosity position undergoing patellofemoral cartilage restoration"

October 2015

- 7** **North American Traveling Fellows Presentations**
- Howard Liu, M.D.**
UNMC Assistant Vice Chancellor, Faculty Development
"Leading with Grit: Practical Principles for Emerging Leaders"
- Basher Alolabi, M.D.**
Shoulder & Elbow Surgery, Trauma, Hamilton General Hospital
"Predictors of Functional Outcomes in Operatively Treated Pelvic Ring Fractures"

- Jonathan Dickens, M.D.**
Assistant Professor, Uniformed Services University of the Health Sciences
"Open Combat Related Calcaneus Fractures"
- Xinning (Tiger) Li, M.D.**
Assistant Professor, Boston University School of Medicine
"Management of anterior Shoulder Instability: Current Concepts for 2015"
- Addisu Mesfin, M.D.**
Assistant Professor, University of Rochester School of Medicine and Dentistry
"Methods to Decrease Infections in Spine Tumor Surgery"
- Anna Miller, M.D.**
Assistant Professor, Wake Forest University School of Medicine
"Setting up a Fracture Liaison Service (Secondary Osteoporotic Fracture Prevention)"

November 2015

- 17** **Joseph Morgan, M.D.**
Hand fellow, Rush University Medical Center, Chicago, IL
"Thermal Injuries"

December 2015

- 11** **L. Scott Levin, M.D.**
Chair, Department of Orthopedic Surgery, Penn Medicine
"Orthoplastic Surgery: Replantation to Transplantation"

February 2016

- 1** **Carri Siedlik, APRN**
Nebraska Medicine Palliative Care
"When the decision is NOT to medically intervene... now what?"

March 2016

- 21-22** **The Hip Society's Rothman-Ranawat Traveling Fellows**
- Derek F. Amanatullah, M.D., Ph.D.**
Assistant Professor, Stanford University Medical Center
"Fluted tapered modular femoral components vs. monolithic femoral components in revision THA"
- Atul Kamath, M.D.**
Assistant Professor, Hospital of the University of Pennsylvania
Director, Center for Hip Preservation
"Obesity and associated comorbidities as predictors of complications after THA"

- Bharath Loganathan, MBBS, D.Ortho, MS (Ortho), MRCS (Edin)**
Shalby Hospital, Ahmedabad, Gujarat, India
"Bearing decisions in primary and revision THA"
- Matthew Wilson, MBBS, FRCS**
Princess Elizabeth Orthopaedic Centre, Exeter, Devon, U.K.
"Reinfection outcomes following single and two-staged surgical revision of infected THA"

April 2016

- 18** **Laura Armas, M.D.**
Associate Professor, UNMC Endocrinology
"Update on Diagnosis and Treatment of Osteoporosis"

June 2016

- 10-11** **Graduation Ceremonies**
- Paul Duwelius, M.D.**
Chair, Orthopedic Research Foundation Director, Total Joint Institute at Providence St. Vincent Medical Center
"Total Hip Arthroplasty: Can We Transition to Bundled Care?" and "What's Up With Surgical Hip Approaches: Front vs. Back?"
- Tom Minas, M.D.**
Professor of Orthopedic Surgery, Harvard Medical School, Brigham and Women's Hospital and Director of the Cartilage Repair Center
"Biological Reconstruction with Cartilage Repair"
- Dara Torres**
Former professional swimmer, 12-time Olympic medalist
"Don't Put an Age Limit on Your Dreams"
- Andrew Dudley, Ph.D.**
Associate Professor, UNMC Genetics Cell Biology and Anatomy
"Cartilage regeneration research"
- 20** **Ross Mathiasen, M.D.**
Assistant Professor, UNMC Emergency Medicine and Primary Care Sports Medicine
"Primary Care Sports Medicine"
- 24** **Kim Buscher**
Occupational Therapist, Nebraska Medicine
"Hand Therapy"

FACULTY ACTIVITIES

KEVIN L. GARVIN, M.D., CHAIRMAN

Adult Reconstructive Surgery

Kevin L. Garvin, M.D. is professor and chair of the University of Nebraska Medical Center's Department of Orthopaedic Surgery and Rehabilitation, as well as the L. Thomas Hood, M.D., Professor of Orthopaedic Surgery and Rehabilitation. He received his medical degree at the Medical College of Wisconsin in 1982. He then completed an orthopaedic surgery residency program at the University of Arkansas for Medical Sciences in Little Rock (1987) and a fellowship in hip surgery at the Hospital for Special Surgery in New York City (1988). He is a board-certified orthopaedic surgeon.

Dr. Garvin is a member of the American Academy of Orthopaedic Surgeons (member, Board of Councilors, 1993-1999; chair, Committee on Infection, 1998-2000; member, Committee on Hip and Knee Evaluation, 1995-2003; member, Board Maintenance of Certification, 2006-2008; member, Adult Reconstruction Knee Program Subcommittee, 2009-2012; member, Adult Reconstruction Hip Program Subcommittee, 2012-2016; member, Board of Specialty Societies, 2016-2017).

He is also a member of the American Orthopaedic Association (ABC Traveling Fellow, 1995; chair, ASEAN International Traveling Fellows, 2001-2002; member, ABC Traveling Fellows Selection Committee, 2004; chair, Resident Leadership Forum, 2007-2008; member, Council of Orthopaedic Residency Directors Board, 2009-2012; member, Membership Committee, 2010-2015; chair, Membership Committee, 2014-2015), The Hip Society (member-at-large, Board of Directors, 2008-2009; chair, Education Committee, 2013-2014; treasurer, 2014-2015; second vice president, 2015-2016; first vice president, 2016-2017), The Knee Society (member, Nominating Committee, 2010-2012; chair, Research Committee, 2012-2015; co-investigator, Strategies to Improve Total Knee Arthroplasty, 2016; member, Membership Committee, 2015-present), the International Hip Society, the Association of Bone and Joint Surgeons and the Mid-America Orthopaedic Association (president, 2004-2005).

From 2014-2016, Dr. Garvin has given more than 60 presentations at local, regional, national and international conferences and institutions. He has served as associate editor for the *Journal of Bone and Joint Surgery*, as well as deputy editor for *Clinical Orthopaedics and Related Research (CORR)*, and continues to serve as a consultant reviewer for both publications, as well as for the *European Journal of Epidemiology*, *The Knee* and the *British Bone and Joint Journal*. In November 2015, he was named a Top Reviewer by the CORR Board of Trustees. He has been selected as one of the Best Doctors in America from 1996-2016 and one of America's Top Doctors by Castle Connolly Medical, Ltd., from 2007-2016.

Current Research Grants:

Pellegrini, V.; **Garvin, K.:** Comparative Effectiveness of Pulmonary Embolism Prevention after Hip and Knee Replacement: Balancing Safety and Efficacy, Medical University of South Carolina/PCORI. 2016-2020. Pellegrini, V (PI); Garvin, K (CI).

Alexander, D.; Ianno, N.; **Garvin, K.:** Preventing Biofilm Growth on Metal alloys used for Medical Implants and Devices by Femtosecond Laser Surface Processing Techniques, Nebraska Research Initiative (NRI). July 2015-June 2017, Alexander, D (PI), Ianno, N (CI), Garvin, K (CI).

Kielian, T.; **Garvin, K.; Hartman, C.:** A Study of the Effect of Surgeries on Human Immune Status. Sponsored by Pfizer, Inc. Oct. 2014-July 2016. Kielian, T (PI); Garvin, K (CI); Hartman, C (CI); et al.

Wang, D.; **Garvin, K.; Hartman, C.:** Early Detection and Intervention of Orthopaedic Implant Loosening using Polymer Theranostics, DHHS/NIH/NIAMS. March 26, 2013-Feb. 28, 2017, Wang, D (PI); Garvin, K (CI); Hartman, C (CI).

Wright, T.; **Garvin, K.:** The Knee Society: Strategies to Improve Total Knee Arthroplasty, NIH. April 2016, Wright, T. (CI), Garvin, K. (CI)

Refereed Articles:

Haider, H., Weisenburger, J., Garvin, K. (2016). Simultaneous measurement of friction and wear in hip simulators. *Proceedings of the Institution of Mechanical Engineers, Part H: Journal of Engineering in Medicine*, 230(5), 373-388.

Garvin, K., White, T., Dusad, A., Hartman, C., Martell, J. (2015). Low Wear Rates Seen in THAs With Highly Crosslinked Polyethylene at 9 to 14 Years in Patients

Younger Than Age 50 Years. *Clinical Orthopaedics and Related Research*, 473(12), 3829-3835.

Yu, S., **Garvin, K.,** Healy, W., Pellegrini, V., Iorio, R. (2015). Preventing hospital readmissions and limiting the complications associated with total joint arthroplasty. *Journal of the American Academy of Orthopaedic Surgeons*, 23(11), e60-e71.

Heim, C., Vidlak, D., Scherr, T., **Hartman, C., Garvin, K.,** Kielian, T. (2015). IL-12 promotes myeloid-derived suppressor cell recruitment and bacterial persistence during *Staphylococcus aureus* orthopedic implant infection. *Journal of Immunology*, 194(8), 3861-3872.

Dusad, A., Pedro, S., Mikuls, T., **Hartman, C., Garvin, K.,** O'Dell, J., Michaud, K. (2015). Impact of total knee arthroplasty as assessed using patient-reported pain and health-related quality of life indices: Rheumatoid arthritis versus osteoarthritis. *Arthritis and Rheumatology*, 67(9), 2503-2511.

Farrell, T., McGuire, T., Bilek, L., Brusnahan, S., Jackson, J., Lane, J., **Garvin, K.,** O'Kane, B., Berger, A., Tuljapurkar, S., Kessinger, M., Sharp, J. G. (2014). Changes in the frequencies of human hematopoietic stem and progenitor cells with age and site. *Experimental Hematology*, 42(2), 146-154.

Konigsberg, B., Hartman, C., Hewlett, A., **Garvin, K.** (2014). Current and future trends in the diagnosis of periprosthetic hip infection. *Orthopedic Clinics of North America*, 45(3), 287-293.

Ren, K., Dusad, A., Zhang, Y., Purdue, P., Fehring, E., **Garvin, K.,** Goldring, S., Wang, D. (2014). Early diagnosis of orthopedic implant failure using macro-molecular imaging agents. *Pharmaceutical Research*, 31(8), 2086-2094.

Book Chapters & Reviews:

Garvin, K., Hartman, C., Konigsberg, B. (2016). Late Infections of the Hip Joint: Resection Arthroplasty and Other Solutions. In *Periprosthetic Joint Infections: Changing Paradigms*, Springer Science + Business Media. Kendoff, D., Morgan-Jones, R., Haddad, F. (Eds.) Chapter 17: 201-208.

Hartman, C., Garvin, K.: (2016). Preventing Sepsis in Total Hip Arthroplasty. In *The Adult Hip: Hip Arthroplasty Surgery: Third Edition*, Wolters Kluwer Health, Philadelphia, PA. Callaghan, J., Rosenberg, A., Rubash, H., Beaulé, P., Clohisy, J., Della Valle, C. (Eds.) Chapter 51: 684-689.

Callaghan, L., Engh, Jr., C., Fehring, T., **Garvin, K.,** Lachiewicz, P., Mabry, T., MacDonald, S., Martin, J., Trousdale, R., Berry, D. (2015). How Do I Get Out of this Jam? Overcoming Common Intraoperative Problems in Primary Total Hip Arthroplasty. In *Instructional Course Lectures*, American Academy of Orthopaedic Surgeons, Chicago, IL. Della Valle, C., Throckmorton, T. (Eds.) Volume 64: 307-326.

Honors, Awards and Offices Held:

- The Hip Society
 - › First Vice President, 2016-2017
 - › Second Vice President, 2015-2016
 - › Treasurer, 2014-2015
- The Knee Society
 - › Member, Research Committee, 2012-2017
 - › Member, Membership Committee, 2014-2016
 - › Chair, Research Committee, 2012-2015

- American Academy of Orthopaedic Surgery
 - › Member, Adult Reconstruction Hip Program Subcommittee, 2012-2016
- American Orthopaedic Association
 - › Member, Membership Committee, 2010-2016
 - › Chair, Membership Committee, 2014-2015
 - › Member, Executive Committee, 2014-2015
- Nebraska Medicine:
 - › Perioperative Executive Committee, Jan. 2015-present
 - › Ambulatory Executive Committee, 2014-present
 - › Surgical Services Executive Committee, 2014-present
 - › Dyad Committee, 2014-present
- UNMC:
 - › Strategic Investment Group, 2015-present
 - › Dissertation Committee, Ph.D. Student, College of Pharmacy, 2014-present
 - › Finance Committee, 2012-2016
 - › Executive Board, 2000-2016
- Board Member, Omaha Sports Commission, Omaha, NE 2007-present
- Board of Trustees, University of South Dakota Foundation, 2006-present
- Editorial Board Member, *Techniques in Knee Surgery*, 2002-present
- Consultant Reviewer:
 - › *British Bone and Joint Journal*, Nov. 2014-present
 - › *The Knee*, March 2012-present
 - › *European Journal of Epidemiology*, 1995-present
 - › *Clinical Orthopaedics and Related Research*, 1991-present
 - › *Journal of Bone and Joint Surgery*, 1990-present

CHRIS A. CORNETT, M.D.

Adult Spine Surgery

Chris A. Cornett, M.D., is a board-certified orthopaedic surgeon. He is an assistant professor in the Department of Orthopaedic Surgery and Rehabilitation, and medical director of Physical and Occupational Therapy at Nebraska Medicine – Nebraska Medical Center and Bellevue. Dr. Cornett received his master's degree in physical therapy (2001) and medical degree (2005) from the University of Nebraska Medical Center. He completed both an orthopaedic surgery internship and orthopaedic surgery residency at the University of Wisconsin Hospital and Clinics in Madison, WI, in 2006 and 2010, respectively. Following residency, Dr. Cornett completed a spine surgery fellowship at the University of Pittsburgh Medical Center in 2011. He is a member of the American Academy of Orthopaedic Surgeons, the North American Spine Society and the Nebraska Orthopedic Society. He also serves on the Physician Advisory Team and is the OneChart Department Deputy for Orthopaedics at Nebraska Medicine.

Refereed Articles:

Cornett, C., Vincent, S., Crow, J., Hewlett, A. (2016). Bacterial Spine Infections in Adults: Evaluation and Management. *Journal of the American Academy of Orthopaedic Surgeons*, 24(1), 11-18.

Hong, P., Cornett, C. (2015). Left-sided inferior vena cava in anterior lumbar spine surgery. *Spine Journal*, 15(7), 1674-1675.

Book Chapters and Reviews:

Cornett, C., Grabowski, G., Kang, J. (2014). Traumatic Arterial Injuries: Diagnosis and Management. In *Textbook Of The Cervical Spine*, Elsevier Saunders. Shen, F., Samartzis, D., Fessler, R. (Eds.) Chapter 20: 197-201.

Cornett, C., Grabowski, G., Kang, J. (2014). Vascular Injuries. In *Textbook Of The Cervical Spine*, Elsevier Saunders. Shen, F., Samartzis, D., Fessler, R. (Eds.) Chapter 50: 447-453.

Honors, Awards and Offices Held:

- Outstanding Instructor Award, UNMC Department of Orthopaedic Surgery and Rehabilitation, received June 2016.
- Nebraska Medicine:
 - › One Chart Operational Owner, December 2015-present
 - › Provider Advisory Group for Patient Experience, November 2015-present
 - › Medical Director of Physical and Occupational Therapy, The Nebraska Medical Center and Bellevue Medical Center, 2014-present

- › Physician Advisory Team Committee, 2013-present
- › Department Deputy for Orthopaedics, One Chart, 2013-present
- › Physician Leadership Academy, 2014-2015
- Consultant Reviewer:
 - › *Pain Medicine*, 2016-present
 - › *Journal of Orthopaedic Research*, October 2015-present
 - › *Clinical Orthopaedics and Related Research*, 2014-present

MIGUEL S. DACCARETT, M.D.

Sports Medicine and Orthopaedic Traumatology

Miguel S. Daccarett, M.D., is an associate professor in the Department of Orthopaedic Surgery and Rehabilitation. He received his medical degree from Pontificia Universidad Xaveriana, IHS in Bogota, Colombia in 1992. Following medical school, Dr. Daccarett completed a general rotating internship and an orthopaedic residency, also in Bogota, Colombia. Upon moving to the United States, he completed three orthopaedic fellowships, including an orthopaedic trauma fellowship (University of Louisville, KY, 2004), an orthopaedic oncology fellowship (University of Florida in Gainesville, FL, 2005), and an orthopaedic sports medicine fellowship (Harvard University/Children's Hospital in Boston, MA, 2006). He is board certified in orthopaedic surgery. Dr. Daccarett is a member of the American Academy of Orthopaedic Surgeons (AAOS), the American Orthopaedic Society for Sports Medicine (AOSSM), the Orthopaedic Trauma Association (OTA), the International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine (ISAKOS), and faculty member of AO North America (AONA). He is also a member of the Colombian Society of Orthopedic Surgery and the Nebraska Orthopedic Society.

Refereed Articles:

Castro, C., Smith, P., **Daccarett, M.** (2016). Candida Glabrata Septic Arthritis Involving the Right Knee After Anterior Cruciate Ligament Graft Placement. *MOJ Orthop Rheumatol*, 4(4), 00147.

Book Chapters and Reviews:

Daccarett, M., Gaddie, T., Streubel, P. (2016). Adult Distal Humerus Fractures: Open Reduction Internal Fixation. In *Case Competencies in Orthopaedic Surgery*, Elsevier. Frank, R., Forsythe, B., Provencher, M. (Eds.) Chapter 15: 138-148.

Honors, Awards and Offices Held:

- Promoted to Associate Professor of Orthopaedic Surgery, UNMC Department of Orthopaedic Surgery and Rehabilitation, July 1, 2015.
- Event Physician, U.S. Olympic Team Trials – Swimming and 2016 Omaha Cup, Omaha, NE, June 17-July 3, 2016.
- Orthopaedic Trauma Surgeon, Nepal Earthquake 2015, Nepal Orthopaedic Hospital, Kathmandu, Nepal, May 17-28, 2015.
- Instructor, Orthopaedic Trauma Association, 2014-present

- Member, Public Relations Committee, Orthopaedic Trauma Association, March 2016-2019
- Reviewer, *European Journal of Orthopaedic Surgery and Traumatology*, 2015-present
- Review Panel Member, *Orthopedics*, 2013-present
- Translator, *Journal of Arthroscopy*, 2008 to present
- Trauma Committee Member, UNMC, 2008-present

FACULTY ACTIVITIES

MARK E. DIETRICH, M.D.

Sports Medicine and Arthroscopic Surgery

Mark E. Dietrich, M.D., is an assistant professor in the Department of Orthopaedic Surgery and Rehabilitation. He received his law degree from the University of Nebraska College of Law in 1994, and his medical degree from the University of Nebraska College of Medicine in 2001. Dr. Dietrich completed a five-year residency program at the University of Nebraska/Creighton University Health Foundation in 2006, followed by an orthopaedic sports medicine fellowship at Minnesota Sports Medicine in Minneapolis in 2007. He is a board-certified orthopaedic surgeon. He is a member of the American Academy of Orthopaedic Surgeons, American Orthopaedic Society for Sports Medicine, Nebraska Orthopaedic Society, Nebraska Medical Association and Nebraska State Bar Association.

Volunteer/Community Service:

Event Physician, U.S. Olympic Team Trials – Swimming and 2016 Omaha Cup, Omaha, NE, June 17-July 3, 2016.

Honors, Awards & Offices Held:

- American Orthopaedic Society for Sports Medicine Council of Delegates, 2012-2016
- UNMC
 - Member, Physicians Leadership Academy, 2015-present
 - Member, Surgical Services Operation Committee, 2015-present
- Sideline Physician for area high school sports teams, 2012-present.

PAUL W. ESPOSITO, M.D.

Pediatric Orthopaedic Surgery

Paul W. Esposito, M.D., is a professor in the Department of Orthopaedic Surgery and Rehabilitation at the University of Nebraska Medical Center, and clinical service chief of orthopaedic surgery at Children's Hospital & Medical Center. He was also awarded the Barbara & Ronald W. Schaefer Endowed Chair of Pediatric Orthopaedic Surgery at the University of Nebraska Medical Center in 2015. Dr. Esposito received his medical degree from Hahnemann Medical College and Hospital in Philadelphia in 1977, and completed his internship and residency in orthopaedic surgery at the U.S. Naval Hospital in Oakland, California (1978 and 1983, respectively). He then completed a pediatric orthopaedic fellowship at Children's Hospital Medical Center in Cincinnati in 1984. Dr. Esposito is a board-certified orthopaedic surgeon. He is a member of the Pediatric Orthopaedic Society of North America, the American Academy of Orthopaedic Surgeons and the American Academy of Pediatrics (AAP). He is a member of the Section on Orthopaedics of the AAP (and past member of the executive committee of this section), and is also active in the Section on Sports Medicine. Dr. Esposito has also served as a reviewer for *PEDIATRICS* and the *Journal of Pediatric Orthopaedics*. He is on the advisory board of directors at Children's Hospital & Medical Center, and served as president of the medical staff (2008-2010). He is a member of the medical advisory board of the Osteogenesis Imperfecta Foundation. He has published multiple book chapters on osteogenesis imperfecta (OI) and made numerous presentations in the last two years regarding the treatment of OI. Dr. Esposito was once again selected as one of Best Doctors in America in 2014-2016, an honor he has received since 1998.

Current Research Grants:

Rush, E., **Esposito, P.**: Brittle Bone Consortium of the Rare Disease Clinical Research Network. Sponsored by Baylor College of Medicine. 2015-2016. Rush, E. (Co-PI), Esposito, P. (Co-PI).

Rush, E., **Esposito, P.**: Brittle Bone Disorders Consortium. Sponsored by Osteogenesis Imperfecta Foundation. 2015-2016. Rush, E. (Co-PI), Esposito, P. (Co-PI).

Refereed Articles:

Azzam, K., Rush, E., Burke, B., Nabower, A., **Esposito, P.** (2016). Mid-term Results of Femoral and Tibial Osteotomies and Fassier-Duval Nailing in Children With Osteogenesis Imperfecta. *Journal of Pediatric Orthopaedics*.

Lesiak, A., **Esposito, P.** (2014). Progressive valgus angulation of the ankle secondary to loss of fibular congruity treated with medial tibial hemiepiphysiodesis and fibular reconstruction. *American Journal of Orthopaedics*, 43(6), 280-283.

Rush, E., Caldwell, K., Kreikemeier, R., Lutz, R., **Esposito, P.** (2014). Osteogenesis imperfecta caused by PPIB mutation with severe phenotype and congenital hearing loss. *Journal of Pediatric Genetics*, 3(1), 29-34.

Articles Accepted for Publication:

Grossman, L., Price, A., Rush, E., Goodwin, J., Wallace, M., **Esposito, P.** (2016) Initial Experience with percutaneous IM rodding of Humeri in Children with Osteogenesis Imperfecta. *Journal of Pediatric Orthopaedics*, 0271-6798.

Book Chapters and Reviews:

Esposito, P.: (2016). Genu Valgum. In *Orthopedic Surgery Clerkship: A Quick Reference Guide for Senior Medical Students*, Springer. Chapter 5.

Honors, Awards and Offices Held:

- Awarded the Barbara & Ronald W. Schaefer Endowed Chair, Pediatric Orthopaedic Surgery, University of Nebraska Medical Center, Omaha, NE, 2015-2020.
- Elected International Ambassador of the Bone and Joint Decade (BJD), Oct. 2014-Nov. 2017
- Medical Advisory Council, Osteogenesis Imperfecta Foundation, July 2011-present
- Board of Directors, Advisory Board, Children's Hospital & Medical Center, 2010-present
- Board of Directors, Physician Director, Children's Specialty Physicians, February 2012-2015.

- Medical Staff Committees, Children's Hospital & Medical Center:
 - Chair, Focused Peer Review Committee, 2016-present
 - Clinical Service Chief, Orthopaedic Surgery, 2009-present
 - Information Technology Oversight Committee, 2009-present
 - Allied Health Committee, 2008-present
 - Credentials Committee, 2008-present
 - Quality and Patient Safety Committee, 2008-present
 - Focused Peer Review Committee, 2004-present
 - Physician's Health Committee, 2004-present
- Manuscript Reviewer, *Journal of Pediatric Orthopaedics*, BMJ Case Reports, 2015-present
- Best Doctors in America, 1998-2016

HANI HAIDER, PH.D.

Director, Orthopaedics Biomechanics and Advanced Surgical Technologies Laboratory

Hani Haider, Ph.D., is a professor and the director of the Orthopaedics Biomechanics & Advanced Surgical Technologies Laboratory, in the Department of Orthopaedic Surgery and Rehabilitation at the University of Nebraska Medical Center. Dr. Haider earned his Ph.D. in Mechanical Engineering from the University of Sheffield in England, where he then conducted research and taught fluid dynamics and mechatronics before joining the faculty of University College London Medical School at the well-known Centre of Biomedical Engineering in Stanmore in 1997. He was the principal mechanical and software engineer who designed and produced the Instron-Stanmore Knee Simulator and was instrumental in the development of the International Standards Organization (ISO) method for simulation and wear testing of knee replacement systems. He joined the faculty of the University of Nebraska Medical Center in March 2000.

Dr. Haider has earned numerous awards and recognition throughout his student and faculty career. Internationally, he has received the KLINGER International Research Prize (1987), the HAP Paul Award (2005) by the International Society for Technology in Arthroplasty (ISTA) for innovation in joint replacement technology, as well as the Robert Fairer Award (2005) and the Manny Horowitz Award (2010) from the American Society for Testing and Materials (ASTM) for his contributions to international standards development. In 2013, ISTA awarded Dr. Haider an "Honorary Lifetime Membership" for outstanding contributions to technology in arthroplasty and to ISTA. Most recently, Dr. Haider was the first recipient of the ISO Committee Chairman's Award (2014) for his contributions to ISO TC 150 - Implants for Surgery - and International Standards Development, as well as the Leroy Wyman Award (2015) by ASTM International F04 Committee for his outstanding contributions to the work of the committee in testing standards for orthopaedic devices. Nationally, Dr. Haider was the 2009 recipient of the Iraqi Academic Conference Award, given to four of the most distinguished academics of Iraqi origin in the United States. Locally, he had received four UNMC awards for outstanding achievement and commercialization of surgical technology innovations.

While at UNMC, Dr. Haider has received over 75 research contracts, mostly from orthopaedic companies in the USA, but also from Europe and Japan, plus federal research funding, altogether totaling over \$10 million. He has presented over 250 papers in peer-reviewed journals and international conferences in the area of orthopaedic implant and surgical technology.

In October 2013, Dr. Haider and his and his team were issued a United States Patent for 'Method and Apparatus for Computer-Aided Surgery.' Further innovations, for 'On-Board Tool Tracking System and Methods of Computer-Assisted Surgery,' Surgery,' are now patent-pending in the U.S., Australia, Canada, Japan, China, Europe and India. These cutting-edge inventions allow orthopaedic surgeons navigated freehand bone cutting for joint replacement.

Dr. Haider has been a member of the Biomedical Engineering Committee of the American Academy of Orthopaedic Surgeons (AAOS), the ORS's Basic Science Committee, and the official representative of the Orthopaedic Research Society (ORS) to the AAOS. He chairs various ASTM International committees and working groups. Dr. Haider is the Deputy Head of the U.S. Delegation for the International Standards Organization's work on medical devices and standards. He is the Scientific Review and Information Technology Director of the International Society of Technology in Arthroplasty (ISTA) and is a member of its Board of Directors. Dr. Haider is the Reviews Editor for the *Journal of Engineering in Medicine*, is on the editorial boards of two international scholarly journals, and is a reviewer for various others.

Current Research Grants:

Haider, H.: Modular Interlock Evaluation of a Unicompartamental Knee Replacement, Arthrex. Principal Investigator, August 10-November 11, 2016.

Haider, H.: Wear of Total Knee-Joint Prostheses, NYUM. Principal Investigator, February 1, 2016-January 31, 2017

Haider, H.: An In-vitro Wear Durability Study of the iBalance Unicondylar Knee System with Vit. E stabilized Highly CrossLinked Bearings, Arthrex. Principal Investigator, October 1, 2015-March 31, 2016.

Haider, H.: In-vitro Durability Study of the Arthrex PS Knee System in Abrasive and Nonabrasive Conditions and Femoral Scratching Test, Arthrex. Principal Investigator, March 1-December 31, 2015.

Haider, H.: A simulator wear study of duo-mobility total hip replacement systems, Lima Corp. Principal Investigator, January 1, 2015-July 18, 2016.

Haider, H.: A simulator Study of the Wear of Biomet Hinged Total Knee Replacement Bearing Components, Ortho. PD. K055.09. Principal Investigator, January 14, 2015-December 31, 2015.

Haider, H.: Experimental Study of Wear Durability of a Novel Unicompartamental Knee Replacement Design, Comparing Standard & Reverse Material Bearing Couples, NYUM. Principal Investigator, January 1, 2015-June 30, 2015.

Haider H.: Extension of a study for the wear of a prototype hinged total knee replacement system Continuation of 2073, Biomet. Principal Investigator, January 2, 2015-June 30, 2015.

Haider, H.: A simulator wear study of ceramic-on-plastic total hip replacement systems from Japan comparing differently processed polymer bearings, Exponent. Principal Investigator, August 1, 2014-March 31, 2015.

Haider, H.: O'Leary, E.: AngioTeacher Interactive Educational Software, UNMC Cardiology. May 23, 2014-completion, Haider (CI), O'Leary (CI).

Refereed Articles:

Urish, K., DeMuth, P., Kwan, B., Craft, D., Ma, D., **Haider, H.**, Tuan, R., Wood, T., Davis, C., III. (2016). Antibiotic-tolerant *Staphylococcus aureus* Biofilm Persists on Arthroplasty Materials. *Clinical Orthopaedics and Related Research*, 474(7), 1649-1656.

Haider, H., Weisenburger, J., Garvin, K. (2016). Simultaneous measurement of friction and wear in hip simulators. Proceedings of the Institution of Mechanical Engineers, Part H: *Journal of Engineering in Medicine*, 230(5), 373-388.

Sanders, A., Lockard, C., Weisenburger, J., **Haider, H.**, Raeymaekers, B. (2015). Using a surrogate contact pair to evaluate polyethylene wear in prosthetic knee joints. *Journal of Biomedical Materials Research - Part B Applied Biomaterials*, 104(1), 133-140.

Book Chapters and Reviews:

Barrera, O.A., **Haider, H.** (2016). Direct Navigation of Surgical Instrumentation.

In *Computer-Assisted Musculoskeletal Surgery: Thinking and Executing in 3D*, Springer International Publishing. Ritacco, L., Milano, F., Chao, E. (Eds.) Chapter 9: 99-113.

Haider, H. (2016). Tribological Assessment of UHMWPE in the Knee. In *UHMWPE Biomaterials Handbook Third Edition - Ultra-High Molecular Weight Polyethylene in Total Joint Replacement and Medical Devices*; Elsevier Inc. Kurtz, S. (Ed.) Chapter 32: 599-634.

Haider, H., Baykal, D. (2016). Wear Assessment of UHMWPE with Pin-on-Disc Testing. In *UHMWPE Biomaterials Handbook Third Edition - Ultra-High Molecular Weight Polyethylene in Total Joint Replacement and Medical Devices*, Elsevier Inc. Kurtz, S. (Ed.) Chapter 30: 553-578.

Honors, Awards and Offices Held:

- "Commercialization of Orthopaedic Surgical System" Award Recipient, UNeMed, 2016.
- Received the "Leroy Wyman Award" by ASTM International F04 Committee for outstanding contributions to the work of the committee in testing standards for orthopaedic devices, May 2015.
- First recipient of the International Standards Organization (ISO) Committee Chairman's Award for "contributions to ISO TC 150 - Implants for Surgery - and International Standards Development." Awarded at the ISO Annual Meeting, Seoul, South Korea, September 2014.
- *Journal of Engineering in Medicine*:
 - > Reviews Editor, IMechE Part H, March 2012-present
 - > Editorial Board Member, IMechE Part H, 2009-present
 - > Reviewer, 2007-present

- International Society of Technology in Arthroplasty (ISTA):
 - > Director, Scientific Review and Information Technology, Sept. 2011-present
 - > Board of Directors, 2005-present
- The Orthopaedic Research Society
 - > Member, Basic Science Education Committee, 2011 - 2016
 - > Official Representative of the Orthopaedic Research Society to the AAOS, February 2011-2016
- Member, Biomedical Engineering Committee, American Academy of Orthopaedic Surgeons, February 2011-2016
- Member, Editorial Board, *Advances in Orthopedics*, June 2010-present
- Reviewer of abstracts, Orthopaedic Research Society, Aug. 2009-present
- International Standards Organization (ISO):
 - > Elected Deputy Head of the US Delegation, 2015-present
 - > Coordinator/Liaison Officer, Working Group 2 (Implant Wear), ISO TC150 US Tag, 2013-present
 - > Member, United States Delegation to Committee SC 150 (Medical Devices), 2002-present
- American Society of Testing and Materials (ASTM) International:
 - > Technical (Expert) contact, Friction of Hips Standard Writing Committee, Working Group/Item WK 28778, 2011-present
 - > Co-Chair, Knee Wear Testing Standards Committee, 2002-present
 - > Chair, Ankle Replacement Testing Standards Committee, 2000-present
- Reviewer:
 - > *Clinical Orthopaedics and Related Research*, July 2010-present
 - > *Journal of Orthopaedic Research*, 2007-present

FACULTY ACTIVITIES

CURTIS W. HARTMAN, M.D.

Adult Reconstructive Surgery

Curtis W. Hartman, M.D., is an associate professor in the Department of Orthopaedic Surgery and Rehabilitation. He received his medical degree at the University of Missouri in 2003, and completed his orthopaedic surgery residency at the University of Nebraska/Creighton University Medical Center Health Foundation in 2008. Following residency, Dr. Hartman completed a fellowship in adult reconstruction at the Rush University Medical Center and Central DuPage Hospital, in Chicago, Illinois, in 2009. He is board certified in orthopaedic surgery. He is a member of the American Academy of Orthopaedic Surgeons (member, Basic Science Subcommittee, 2010-2014), the Mid-America Orthopaedic Association, the American Association of Hip and Knee Surgeons, the American Orthopaedic Association's Emerging Leaders Program, the Nebraska Medical Society, the Nebraska Orthopaedic Society and the Metro Omaha Medical Society.

Current Research Grants:

Wang, D.; **Garvin, K.; Hartman, C.:** Early Detection and Intervention of Orthopaedic Implant Loosening using Polymer Theranostics, DHHS/NIH/NIAMS. March 2013-February 2017, Wang, D (PI); Garvin, K (CI); Hartman, C (CI).

Hartman, C.: The Utility of Oral Antibiotic Therapy Following 2-Stage Revision Arthroplasty for Infected Prosthetic Hips and Knees, Rush University. September 2013-present. Hartman, C (PI).

Kielian, T.; **Garvin, K.; Hartman, C.:** A Study of the Effect of Surgeries on Human Immune Status. Sponsored by Pfizer, Inc. October 2014-July 2016. Kielian, T (PI); Garvin, K (CI); Hartman, C (CI); et al.

Hartman, C.; Konigsberg, B.: A Multicenter, Randomized, Clinical Outcome of Visionaire Patient Matched Technology vs. Standard Surgical Instrumentation in Total Knee Arthroplasty: Clinical Trial, Smith & Nephew. February 2011- February 2016, PI: Hartman, C (PI); Konigsberg, K (CI).

Refereed Articles:

Mark Coventry, M.D. Award Paper, Annual Specialty Day Meeting of The Knee Society/AAHKS, Orlando, FL, March 5, 2016

- Frank, J., Kayupov, E., Moric, M., Segreti, J., Hansen, E., **Hartman, C., et al.**, (2016). Oral Antibiotics Reduce Reinfection After Two-Stage Exchange: A Multicenter, Randomized Controlled Trial. *Clinical Orthopaedics and Related Research*, 1-6.

Garvin, K., White, T., Dusad, A., Hartman, C., Martell, J. (2015). Low Wear Rates Seen in THAs With Highly Crosslinked Polyethylene at 9 to 14 Years in Patients Younger Than Age 50 Years. *Clinical Orthopaedics and Related Research*, 473(12), 3829-3835.

Heim, C., Vidlak, D., Scherr, T., **Hartman, C., Garvin, K.,** Kielian, T. (2015). IL-12 promotes myeloid-derived suppressor cell recruitment and bacterial persistence during *Staphylococcus aureus* orthopedic implant infection. *Journal of Immunology*, 194(8), 3861-3872.

Dusad, A., Pedro, S., Mikuls, T., **Hartman, C., Garvin, K.,** O'Dell, J., Michaud, K. (2015). Impact of total knee arthroplasty as assessed using patient-reported pain and health-related quality of life indices: Rheumatoid arthritis versus osteoarthritis. *Arthritis and Rheumatology*, 67(9), 2503-2511.

Konigsberg, B., Hartman, C., Hewlett, A., **Garvin, K.** (2014). Current and future trends in the diagnosis of periprosthetic hip infection. *Orthopedic Clinics of North America*, 45(3), 287-293.

Hartman, C. (2014). CORR Insights®: Modular Tapered Implants for Severe Femoral Bone Loss in THA: Reliable Osseointegration but Frequent Complications. *Clinical Orthopaedics and Related Research*, 473(2), 561-562.

Book Chapter and Reviews:

Garvin, K., Hartman, C., Konigsberg, B. (2016). Late Infections of the Hip Joint: Resection Arthroplasty and Other Solutions. In *Periprosthetic Joint Infections: Changing Paradigms*, Springer Science + Business Media. Kendoff, D., Morgan-Jones, R., Haddad, F. (Eds.) Chapter 17: 201-208.

Hartman, C., Garvin, K.: (2016). Preventing Sepsis in Total Hip Arthroplasty. In *The Adult Arthroplasty Surgery: Third Edition*, Wolters Kluwer Health, Philadelphia, PA. Callaghan, J., Rosenberg, A., Rubash, H., Beaulé, P., Clohisy, J., Della Valle, C. (Eds.) Chapter 51: 684-689.

Honors, Awards and Offices Held:

- Medical Provider, U.S. Olympic Team Trials – Swimming and 2016 Omaha Cup, Omaha, NE, June 17-July 3, 2016.
- Volunteer Surgeon, Operation Walk USA, Omaha, NE, December 15, 2015.
- Medical Provider, 2015 FIVB Grand Prix Volleyball Finals, Omaha, NE July 22-26, 2015.
- Outstanding Instructor Award, UNMC Department of Orthopaedic Surgery and Rehabilitation, received June 2014.
- Board of Directors, Metro Omaha Medical Society Foundation, Jan. 2015-present
- Member, Membership Committee, Metro Omaha Medical Society, Jan. 2013-present
- Orthopaedic Basic Science Subcommittee, American Academy of Orthopaedic Surgeons, 2012-2016.
- Member, Finance Committee, Mid-America Orthopaedic Association, 2015-2016

UNMC:

- Member, UNMC Graduate Faculty, May 2013-present
- Member, Dissertation Committee, Tyler Scherr, Ph.D. Student, Department of Pathology and Microbiology, UNMC College of Medicine, 2012-present
- Member, Dissertation Committee, Raheleh Miralami, Ph.D. Student, MSIA Program, UNMC College of Medicine, 2012-present
- Member, Dissertation Committee, Ke Ren, Ph.D. Student, Department of Pharmaceutical Sciences, UNMC College of Pharmacy, 2012-present
- M1-M2 ICE Course Instructor, September 2009-present
- M3 Course Instructor September 2009- present
- Nebraska Orthopaedic Hospital:
 - Utilization Review Committee, 2013-present
 - Finance Committee, 2012-present

BRIAN P. HASLEY, M.D.

Pediatric Orthopaedic and Spine Surgery

Brian P. Hasley, M.D., is an associate professor in the Department of Orthopaedic Surgery and Rehabilitation at the University of Nebraska Medical Center. He earned his medical degree from the University of Nebraska College of Medicine in 1999 and completed his residency in orthopaedic surgery at the University of Nebraska Medical Center in 2004. Following residency, Dr. Hasley completed the Dorothy and Bryant Edwards Fellowship in pediatric orthopaedic surgery and scoliosis at the Texas Scottish Rite Hospital for Children, University of Texas at Southwestern Medical Center in Dallas (2005). Dr. Hasley completed post fellowship spine research at the same facility. Dr. Hasley is board certified in orthopaedic surgery. He is a fellow of the American Academy of Orthopaedic Surgeons, and a member of the Scoliosis Research Society the Pediatric Orthopaedic Society of North America (POSNA) and the Nebraska Orthopaedic Society. Dr. Hasley has been selected as one of the Best Doctors in America from 2007-2014.

Honors, Awards and Offices Held:

Children's Hospital & Medical Center:

- Chair, Department of Surgery, 2016-present
- Medical Director of the Pediatric Orthopaedic Clinics of the Children's Specialty Physicians, May 2013-present

Medical Staff Committees, Children's Hospital & Medical Center:

- Chair, Surgical Services Interdisciplinary Committee, 2016-present
- Medical Executive Committee, 2016-present
- Focused Peer Review Committee, 2008-present

M. LAYNE JENSON, M.D.

Pediatric Orthopaedic and Spine Surgery

M. Layne Jenson, M.D., is an assistant professor in the Department of Orthopaedic Surgery and Rehabilitation. He received a master's degree in Business Administration with a concentration in Health Organization Management from Texas Tech University in Lubbock in 2005. He completed his medical degree at Texas Tech University School of Medicine in Lubbock, also in 2005. Dr. Jenson completed his residency in orthopaedic surgery at the Texas Tech University Health Science Center in 2010. Following residency, he completed the Ryerson Fellowship in Pediatric Orthopaedic Surgery at the Northwestern School of Medicine at Children's Memorial Hospital in Chicago in 2011. Dr. Jenson is a board-certified orthopaedic surgeon and practices pediatric orthopaedic and spine surgery at UNMC's pediatric hospital partner, Children's Hospital and Medical Center. He is a member of the American Academy of Orthopaedic Surgeons (AAOS), a candidate member of the Pediatric Orthopaedic Society of North America (POSNA) and a member of the Nebraska Medical Society.

Honors, Awards and Offices Held:

- Children's Hospital and Medical Center:
 - › Emergency Department Interdisciplinary Committee, Jan. 2015-Present
 - › Surgical Services Interdisciplinary Committee, Jan. 2014-Present
 - › Program Developer, New Sports Medicine Program, 2013-Present

BEAU S. KONIGSBERG, M.D.

Adult Reconstructive Surgery

Beau S. Konigsberg, M.D., is an associate professor in the Department of Orthopaedic Surgery and Rehabilitation. Dr. Konigsberg received his medical degree from the University of Nebraska Medical Center in 2001, and completed his orthopaedic surgery residency at the University of Nebraska/Creighton University Health Foundation in 2007. Following residency, Dr. Konigsberg completed an adult reconstruction and arthroplasty fellowship at Midwest Orthopaedics at Rush/Rush University Medical Center in Chicago, Illinois (2008). He is board certified in orthopaedic surgery. He is a member of the Orthopaedic Research and Education Foundation, the American Academy of Orthopaedic Surgeons (member, Adult Reconstruction Hip Program, 2015-present), the Mid-America Orthopaedic Association, the American Association of Hip and Knee Surgeons, the American Orthopaedic Association Emerging Leaders Program, the Nebraska Orthopaedic Society, the Nebraska Medical Association and the Metro Omaha Medical Society.

Current Research Grants:

Kielian, T.; **Garvin, K.; Hartman, C.; Konigsberg, B.:** A Study of the Effect of Surgeries on Human Immune Status. Sponsored by Pfizer, Inc. October 2014-July 2016. Kielian, T (PI); Garvin, K (CI); Hartman, C (CI); Konigsberg, B (CI) et al.

Hartman, C.; Konigsberg, B.: A Multicenter, Randomized, Clinical Outcome of Visionaire Patient Matched Technology vs. Standard Surgical Instrumentation in Total Knee Arthroplasty: Clinical Trial, Smith & Nephew. Feb. 18, 2011- Feb. 18, 2016. I: Hartman, C (PI); Konigsberg, K (CI).

Dudley, A.; Othman, S.; **Konigsberg, B.:** Calcium Optimized Cartilage Formation in 3D Mesenchymal Stem Cell Cultures. Sponsored by Nebraska Department of Health and Human Services. July 2014-June 2015. Dudley, A (PI); Othman, S (CI); Konigsberg, B (CI).

Refereed Articles:

Konigsberg, B., Hartman, C., Hewlett, A., **Garvin, K.** (2014). Current and future trends in the diagnosis of periprosthetic hip infection. *Orthopedic Clinics of North America*, 45(3), 287-293.

Dwyer, J., Reynoso, J., Seevers, G., Schmid, K., Muralidhar, P., **Konigsberg, B.,** Lynch, T., Johanning, J. (2014). Assessing Preoperative Frailty Utilizing Validated Geriatric Mortality Calculators and Their Association with Postoperative Hip Fracture Mortality Risk. *Geriatric Ortho Surg and Prevention*. 5(3), 109-115.

Book Chapter and Reviews:

Garvin, K., Hartman, C., Konigsberg, B. (2016). Late Infections of the Hip Joint: Resection Arthroplasty and Other Solutions. In *Periprosthetic Joint Infections: Changing Paradigms*, Springer Science + Business Media. Kendoff, D., Morgan-Jones, R., Haddad, F. (Eds.) Chapter 17: 201-208.

Honors, Awards and Offices Held:

- Medical Provider, U.S. Olympic Team Trials – Swimming and 2016 Omaha Cup, Omaha, NE, June 17-July 3, 2016.
- Medical Provider, 2015 FIVB Grand Prix Volleyball Finals, Omaha, NE July 22-26, 2015.
- Member, Adult Reconstruction Hip Program Committee, American Association of Orthopaedic Surgeons. June 2015-present
- UNMC:
 - › Member, Faculty Senate, College of Medicine, Jan. 2014-present
 - › Member, Dissertation Thesis Committee, Krishna Sarma, Ph.D. student, Department of Genetics, Cell Biology and Anatomy, Dec. 2013-present
 - › Member, Admissions Committee, May 2011-present
 - › Course Director, UNMC Orthopaedic Surgery Grand Rounds, Oct. 2010-present

- › Instructor, 2nd Year Medical Students, Aug. 2009-present
- Nebraska Medicine
 - › Medical Director, Orthopaedic Clinic, August 2016-present
 - › Member, Ambulatory Rooming Project, Nov. 2015-present
 - › Member, Periop Quality, Safety & Patient Experience Committee, Sept. 2015-present
- Member, Membership Committee, Metro Omaha Medical Society, April 2012-present
- Section Chief, Orthopaedics, VA Medical Center, Jan. 2009-present
- Consultant Reviewer:
 - › *Techniques in Orthopaedics*, June 2015-present
 - › *Orthopaedics*, Sept. 2013-present
 - › *Journal of the American Geriatrics Society*, Sept. 2010-present

FACULTY ACTIVITIES

SEAN V. MCGARRY, M.D.

Musculoskeletal Oncology

Sean V. McGarry, M.D., is an associate professor in the Department of Orthopaedic Surgery and Rehabilitation. Dr. McGarry received his medical degree from the Creighton University School of Medicine in 1998. He completed a surgery internship at the University of Colorado Health Sciences Center in 1999 and continued on to complete his orthopaedic residency in 2004. Following residency, he completed an orthopaedic oncology fellowship at the University of Florida – Shands Hospital in 2005, where he researched the role of stem cells in bone and soft tissue cancer. Dr. McGarry is board certified in orthopaedic surgery and is a member of the American Academy of Orthopaedic Surgeons, the Musculoskeletal Transplant Foundation, the Musculoskeletal Tumor Society, the National Comprehensive Cancer Network, the Mid-America Orthopaedic Society, the Nebraska Orthopaedic Society and the Metro Omaha Medical Society.

Refereed Articles:

Martin, K., Firestone, D., **McGarry, S.**, Dorfman, H., Kazmi, S. (2014). Chondroblastoma-like osteosarcoma. *Pathology International*, 64(8), 409-411.

Von Mehren, M., Randall, R., Benjamin, R., Boles, S., Bui, M., Casper, E., Conrad III, E., DeLaney, T., Ganjoo, K., George, S. Gonzalez, R., Heslin, M., Kane III, J., Mayerson, J., **McGarry, S.** et. al. (2014). Gastrointestinal stromal tumors, version 2.2014: Featured updates to the NCCN Guidelines. *JNCCN Journal of the National Comprehensive Cancer Network*, 12(6), 853-862.

Von Mehren, M., Randall, R., Benjamin, R., Boles, S., Bui, M., Casper, E., Conrad III, E., DeLaney, T., Ganjoo, K., George, S. Gonzalez, R., Heslin, M., Kane III, J., Mayerson, J., **McGarry, S.** et. al. (2014). Soft tissue sarcoma, version 2.2014: Featured updates to the NCCN guidelines. *JNCCN Journal of the National Comprehensive Cancer Network*, 12(4), 473-483.

Honors, Awards and Offices Held:

- Medical Provider, U.S. Olympic Team Trials – Swimming and 2016 Omaha Cup, Omaha, NE, June 17-July 3, 2016.
- Medical Provider, 2015 FIVB Grand Prix Volleyball Finals, Omaha, NE July 22-26, 2015.

UNMC:

- Member, Faculty Senate, June 2013-present
- Member, Continuing Education Committee, Oct. 2012-present
- Member, Tissue Bank Review Committee, Member, 2006-present
- Musculoskeletal Transplant Foundation (MTF):
 - Member, Executive Committee, Jan. 2015-present
 - Member, Membership/ Nominations Committee Member, Feb. 2012 – present
 - Member, Medical Board of Trustees, April 2006-present

- Member, Children's Hospital of Omaha Bylaws Committee, Member, Jan. 2008-present
- National Comprehensive Cancer Network (NCCN):
 - Member, Soft Tissue Sarcoma Panel, July 2007-present
 - Member, Bone Cancer Panel, May 2006-present
- Consultant Reviewer:
 - *Clinical Orthopaedics and Related Research*, March 2011-present
 - *Orthopaedics*, Feb. 2011-present

MATTHEW A. MORMINO, M.D.

Orthopaedic Traumatology and Lower Extremity

Matthew A. Mormino, M.D., is professor and residency program director, as well as the Herman Frank Johnson, M.D., Professor of Orthopaedic Surgery and Rehabilitation in the Department of Orthopaedic Surgery and Rehabilitation. He received his medical degree from the University of Illinois College of Medicine (1991) and completed his orthopaedic surgery residency at Creighton University/University of Nebraska Medical Center Health Foundation (1996). He also completed a trauma fellowship at the University of Washington in 1997. A board-certified orthopaedic surgeon, Dr. Mormino is a diplomate of the American Board of Orthopaedic Surgery. He is a member of the American Academy of Orthopaedic Surgeons, the Orthopaedic Trauma Association and the Mid-America Orthopaedic Association. He serves as a consultant reviewer of the Journal of the American Academy of Orthopaedic Surgeons. Dr. Mormino has been selected as one of the Best Doctors in America from 2005-2016, and as one of Castle Connolly's Regional Top Doctors from 2012-2016.

Refereed Articles:

Mellema, J. J., Doornberg, J. N., Molenaars, R. J., Ring, D., Kloen, P., Traumatology Study Collaborative & Science of Variation Group. (2016). Interobserver reliability of the Schatzker and Luo classification systems for tibial plateau fractures. *Injury, Int. J. Care Injured*, 47(4), 944-949.

Chiang, J., Johnson, J., Tarkin, I., Siska, P., Farrell, D., **Mormino, M.** (2016). Plate augmentation for femoral nonunion: more than just a salvage tool? *Archives of Orthopaedic and Trauma Surgery*, 136(2), 149-156.

Bruinsma, W., Guitton, T., Ring, D., Science of Variation Group. (2014). Radiographic loss of contact between radial head fracture fragments is moderately reliable. *Clinical Orthopaedics and Related Research*, 472(7), 2113-2119.

Honors, Awards and Offices Held:

- Medical Provider, U.S. Olympic Team Trials – Swimming and 2016 Omaha Cup, Omaha, NE, June 17-July 3, 2016.
- Mid-America Orthopaedic Association:
 - Chairman, Finance Committee, 2014-present
 - Treasurer, 2014-present
- AO North America:
 - Fellowship Advisory Board, 2011-2015
 - Faculty, 1997-present

- Nebraska Medicine
 - Medical Director, Perioperative Services, 2008- present
 - Medical Director, Orthopaedic Surgery Clinic, 2000-2016
 - Graduate Medical Education Committee
- Member, Education Committee, Orthopaedic Trauma Association, 2012-2015.
- Consultant Reviewer:
 - *Journal of Orthopaedic Trauma*, Feb. 2014-present
 - *Journal of Surgical Education*, 2010-present
 - *Journal of the American Academy of Orthopaedic Surgeons*, 1999-present

SUSAN A. SCHERL, M.D.

Pediatric Orthopaedic Surgery

Susan A. Scherl, M.D., is a professor in the Department of Orthopaedic Surgery and Rehabilitation. She earned her medical degree from the Boston University School of Medicine in 1987. Dr. Scherl completed two years of a general surgery residency at St. Luke's/Roosevelt Hospital Center in New York (1989) and a five-year orthopaedic residency at State University of New York Health Science Center in Brooklyn (1994). She completed a pediatric orthopaedic fellowship at Case Western Reserve University in Cleveland in 1995. She is board certified in orthopaedic surgery and is a member of the Pediatric Orthopaedic Society of North America (POSNA), the American Orthopaedic Association, the American Academy of Orthopaedic Surgeons, the American Academy of Pediatrics and the Orthopaedic Trauma Association. In addition, she is the only orthopaedic member of the Helfer Society, the professional organization of child abuse physicians. Dr. Scherl was selected as one of the Best Doctors in America for 2003-2005, and 2007-2016. She has edited two textbooks on musculoskeletal medicine, authored numerous book chapters and article reviews and regularly presents at conferences and institutions across the country.

Refereed Articles:

Scherl, S. (2014). CORR Insights(R): What factors influence applicants' rankings of orthopaedic surgery residency programs in the National Resident Matching Program? *Clin Orthop Relat Res*, 472(9), 2867-2869.

Book Chapters and Reviews:

Scherl, S. (2015). The multiply injured child. In *The Pediatric Upper Extremity*, Springer New York. Chapter 37: 861-878.

Scherl, S., Kay, R. (2014). Management of the Multiply Injured Child. In *Rockwood and Wilkins' Fractures in Children: Eighth Edition*. Wolters Kluwer Health, Philadelphia, PA. Chapter 5.

Honors, Awards and Offices Held:

- Recognized in the "Women Pioneers in POSNA" exhibit, 32nd Annual Meeting of the Pediatric Orthopaedic Society of North America, April 2016
- Volunteer Physician, Perry Outreach Program: Women in Orthopaedics, UNMC/The Perry Initiative, Omaha, NE, 2014-2016
- Allied Health Representative, AAOS Annual Meeting Program Committee, June 2016-present
- Member, Planning Committee, American Academy of Pediatrics/Society of Pediatric Radiologists Combined Course: Imaging in Child Abuse, 2016

- American Academy of Pediatrics liaison from the Section on Orthopaedics to the Committee on Child Abuse and Neglect, June 2016-June 2019
- Children's Hospital & Medical Center:
 - Omaha Surgical Services Interdisciplinary Committee, Jan. 2012-present
 - Omaha Education Committee, January 2011-present
 - Omaha Transfusion Committee, January 2010-2015
 - Omaha Trauma Performance Improvement and Patient Safety Committee, 2009-present

- Pediatric Orthopaedic Society of North America:
 - Program Chair, 32nd Annual Meeting, Indianapolis, IN, 2015-2016
 - Member at Large, Board of Directors, 2015-2018
 - Program Committee, May 2013-2017
 - Advocacy Committee, May 2013-present
- American Orthopaedic Association:
 - Member, Traveling Fellowship Committee, June 2012-June 2016
 - Chair, ASEAN Traveling Fellowship Subcommittee, June 2011-June 2016

JUSTIN C. SIEBLER, M.D.

Orthopaedic Traumatology

Justin C. Siebler, M.D., is an associate professor in the Department of Orthopaedic Surgery and Rehabilitation. Dr. Siebler received his medical degree at the University Nebraska Medical Center in 2004 and completed his orthopaedic residency at the Creighton University/University of Nebraska Health Foundation Orthopaedic Surgery Residency Program in 2009. He then completed an orthopaedic traumatology fellowship at the Florida Orthopaedic Institute in Tampa, Florida in 2010. Prior to joining the department, Dr. Siebler was an assistant professor of orthopaedic surgery at Creighton University (2010-2014). He is a board-certified orthopaedic surgeon, and a fellow of the American Academy of Orthopaedic Surgeons and the American Board of Orthopaedic Surgery. He is a member of the Orthopaedic Trauma Association, the Mid-America Orthopaedic Association and the AO Trauma North America Musculoskeletal Trauma Faculty.

Refereed Articles:

Yoon, R., Bible, J., Marcus, M., Donegan, D., Bergmann, K., **Siebler, J.**, Mir, H., Liporace, F. (2015). Outcomes following combined intramedullary nail and plate fixation for complex tibia fractures: A multi-centre study. *Injury, Int. J. Care Injured*, 46(6), 1097-1101.

Azzam, K., **Siebler, J.**, Bergmann, K., **Daccarett, M.**, **Mormino, M.** (2014). Percutaneous retrograde posterior column acetabular fixation: Is the sciatic nerve safe? A cadaveric study. *Journal of Orthopaedic Trauma*, 28(1), 37-40.

Grimsrud, C., Siebler, J. (2014). Small fragment locking plate as provisional internal fixation in severe open both-bone forearm fractures. *Journal of Hand Surgery*, 39(8), 1615-1619.

Honors, Awards and Offices Held:

- Promoted to Associate Professor of Orthopaedic Surgery, UNMC Department of Orthopaedic Surgery and Rehabilitation, July 1, 2016.
- Medical Provider, U.S. Olympic Team Trials – Swimming and 2016 Omaha Cup, Omaha, NE, June 17-July 3, 2016.
- Physician of the Year, Omaha Chapter of the Association of Perioperative Nurses, Omaha, NE, awarded May 2015.
- Member, Trauma Program Committee, American Academy of Orthopaedic Surgeons, 2016-present

- Nebraska Medicine:
 - Member, Patient Outcomes Committee, 2016-present
 - Member, Perioperative Surgical Services Operations Committee, 2015-present
 - Co-Leader, Clinical Effectiveness Trauma Committee, 2015-2016
 - Member, Trauma Peer Review Committee, 2014-present
 - Member, Trauma Performance Improvement/Patient Safety Committee, 2014-present

- UNMC:
 - Member, Musculoskeletal Phase One Curriculum Design Committee, 2016-present
 - Member, Continuing Medical Education Committee, 2015-present
 - Member, Career Launch Oversight Committee, 2015-present

FACULTY ACTIVITIES

PHILIPP N. STREUBEL, M.D.

Shoulder, Elbow and Hand Surgery

Philipp N. Streubel, M.D., is an assistant professor in the Department of Orthopaedic Surgery and Rehabilitation. Dr. Streubel received his medical degree at Pontificia Universidad Javeriana in 2002 and completed his orthopaedic residency at the Universidad del Rosario in Bogotá in 2008. He then moved to the United States and completed three surgical fellowships: orthopaedic trauma at Vanderbilt Medical Center in Nashville, TN, in 2001; shoulder and elbow surgery at the Mayo Clinic in Rochester, MN, in 2012 and hand surgery at Rush University Medical Center in Chicago, IL, in 2014. Dr. Streubel has extensive research experience and served as a research coordinator at Fundacion Santa Fe de Bogota in Bogota, Colombia (2002-2004); research fellow at the Center of Investigation and Documentation, AO Foundation in Zurich, Switzerland (2007); and research fellow for the Orthopaedic Trauma Service at the Washington University School of Medicine in St. Louis, MO (2008 – 2010). He has written over 50 peer-reviewed papers and book chapters, and given over 40 oral and poster presentations at national and international meetings. He is a candidate member of the American Society for Surgery of the Hand and the American Academy of Orthopaedic Surgery, as well as a member of the Orthopaedic Trauma Association, the Colombian Society of Orthopedic Surgery and Traumatology, the AO Foundation Alumni Association, the Mid-America Orthopaedic Association, the Mayo Clinic Alumni Association and the Vanderbilt Orthopedic Society. Dr. Streubel is fluent in English, Spanish and German.

Refereed Articles:

Collinge, C., Hymes, R., Archdeacon, M., **Streubel, P.**, Obremskey, W., Weber, T., Watson, J., Lowenberg, D. (2016). Unstable Proximal Femur Fractures Treated With Proximal Femoral Locking Plates: A Retrospective, Multicenter Study of 111 Cases. *Journal of Orthopaedic Trauma*, 30(9), 489-495.

Streubel, P., Simone, J., Morrey, B., Sanchez-Sotelo, J., Morrey, M. (2016). Infection in total elbow arthroplasty with stable components: outcomes of a staged surgical protocol with retention of the components. *Bone Joint J*, 98-b(7), 976-983.

Streubel, P., Moustoukas, M., Obremskey, W. (2016). Locked plating versus cephalomedullary nailing of unstable intertrochanteric femur fractures. *Eur J Orthop Surg Traumatol*, 26(4), 385-390.

Streubel, P., Simone, J., Cofield, R., Sperling, J. (2016). Revision of failed humeral head resurfacing arthroplasty. *International Journal of Shoulder Surgery*, 10(1), 21-27.

Olszewski, D., **Streubel, P.**, Stucken, C., Ricci, W., Hoffmann, M., Jones, C., Sietsema, D., Tornetta, P., III. (2016). Fate of patients with a "Surprise" positive culture after nonunion surgery. *Journal of Orthopaedic Trauma*, 30(1), e19-e23.

Book Chapters and Reviews:

Streubel, P., Steinmann, S. (2016). Management of Periprosthetic Fractures of the Humerus: Open Reduction vs. Revision Prosthesis. In *Advanced Reconstruction: Shoulder 2: AAOS/ASES*. Abrams, J., Bell, R., Tokish, J. (Eds.) Chapter 50.

Streubel, P. (2016). Introduction. *Operative Techniques in Sports Medicine The Athlete's Wrist*, 24(2), 85.

Miller, R., Streubel, P. (2016). Scapholunate Advanced Collapse: Four-Corner Fusion and Proximal Row Carpectomy. *Operative Techniques in Sports Medicine*, 24(2), 117-122.

Daccarett, M., Gaddie, T., Streubel, P. (2016). Adult Distal Humerus Fractures: Open Reduction Internal Fixation. In *Case Competencies in Orthopaedic Surgery*, Elsevier. Frank, R., Forsythe, B., Provencher, M. (Eds.) Chapter 15: 138-148.

Streubel, P., Cohen M. Arthrofibrosis: Management via arthroscopic and arthroscopically assisted techniques. In: *The Elbow and Wrist: AANA Advanced Arthroscopic Surgical Technique*.

Streubel, P., Cohen, M. (2015). Lateral Collateral Ligament Injuries. In *Elbow Trauma: A Master Skills Publication*, American Society of Surgery of the Hand.

Fernandez, J., **Streubel, P.** (2015). Volar plating of distal radius fractures. In *Operative Techniques in Orthopaedic Surgery*, Wolters Kluwer, Lippincott Williams and Wilkins. Wiesel, S. (Ed.) 2nd Edition, Vol. 3: Hand, Shoulder and Elbow.

Streubel, P., Cohen, M. (2015). Open surgical release for contractures of the elbow. *Journal of the American Academy of Orthopaedic Surgeons*, 23(6), 328-338.

Streubel, P., Sanchez-Sotelo, J., Steinmann, S. (2014). Proximal humeral fractures. In *Rockwood, Green, and Wilkins Fractures in Adults and Children: Eighth Edition* (Vol. 1-2).

Streubel, P., Pesántez, R. (2014). Diaphyseal fractures of the radius and ulna. In *Rockwood, Green, and Wilkins Fractures in Adults and Children: Eighth Edition* (Vol. 1-2).

Honors, Awards and Offices Held:

- Medical Provider, U.S. Olympic Team Trials – Swimming and 2016 Omaha Cup, Omaha, NE, June 17-July 3, 2016.
- Medical Provider, 2015 FIVB Grand Prix Volleyball Finals, Omaha, NE July 22-26, 2015.
- Invited Editor, *Operative Techniques in Sports Medicine: The Athlete's Wrist*, Elsevier, June 2016
- Contributing Editor, 2016 Yearbook of Hand and Upper Limb Surgery, 2016
- Contributing Editor, 2015 Yearbook of Hand and Upper Limb Surgery, 2015
- Test Writer, AANA/ASES Maintenance of Certification Exam Program, 2015
- Member, International Relations Committee, American Society for Surgery of the Hand, 2016-present
- Member, Research and Development Committee, UNMC, 2016-present
- AO North America
 - > Trauma Faculty, 2014-present
 - > Hand Faculty, 2014-present
- Consultant Reviewer
 - > *Journal of Orthopaedic Trauma*, 2012-present
 - > *Journal of Shoulder and Elbow Surgery*, 2012-present

MATTHEW J. TEUSINK, M.D.

Shoulder and Elbow Surgery

Matthew J. Teusink, M.D., is an assistant professor in the Department of Orthopaedic Surgery and Rehabilitation. Dr. Teusink received his medical degree from the University of Iowa Carver College of Medicine in Iowa City, IA, in 2007. He then completed his orthopaedic residency at the University of Iowa Hospitals and Clinics, also in Iowa City, in 2012. Following residency, Dr. Teusink completed a shoulder and elbow fellowship at the Florida Orthopaedic Institute in Tampa, FL, from 2012-2013. He is a reviewer for the Journal of Shoulder and Elbow Surgery and Orthopaedics. He is a candidate member of the American Academy of Orthopaedic Surgery, as well as a member of the Mid-America Orthopedic Association, the Nebraska Orthopaedic Society and the American Orthopaedic Association's Emerging Leaders Program.

Refereed Articles:

Weng, L., **Teusink, M.**, Shuler, F., Parecki, V., Xie, J. (2016). Highly controlled coating of strontium-doped hydroxyapatite on electrospun poly(ϵ -caprolactone) fibers. *Journal of Biomedical Materials Research - Part B Applied Biomaterials*.

Teusink, M., Pappou, I., Schwartz, D., Cottrell, B., Frankle, M. (2015). Results of closed management of acute dislocation after reverse shoulder arthroplasty. *Journal of Shoulder and Elbow Surgery*, 24(4), 621-627.

Teusink, M., Otto, R., Cottrell, B., Frankle, M. (2014). What is the Effect of Postoperative Scapula Fractures on Outcomes of Reverse Shoulder Arthroplasty? *Journal of Shoulder and Elbow Surgery*, 23(6), 782-790.

Schwartz, D., Cottrell, B., **Teusink, M.**, Clark, R., Downes, K., Tannenbaum, R., Frankle, M. (2014). Factors that predict postoperative motion in patients treated with reverse shoulder arthroplasty. *Journal of Shoulder and Elbow Surgery*, 23(9), 1289-1295.

Cabezas, A., Gutiérrez, S., **Teusink, M.**, Schwartz, D., Hartzler, R., Santoni, B., Frankle, M. (2014). Kinematic impact of size on the existing glenohumeral joint in patients undergoing reverse shoulder arthroplasty. *Clinical Biomechanics*, 29(6), 622-628.

Book Chapters and Reviews:

Xie, J., Jiang, J., **Teusink, M.**, Shuler, F. (2016). Hydroxyapatite Nanocomposites for Tendon Repair. In *Nanocomposites for Musculoskeletal Tissue Regeneration*, Woodhead. Chapter 15: 307-330.

Otto, R., **Teusink, M.** (2016). Reverse Shoulder Arthroplasty in the Setting of Scapula Fractures. In *Reverse Shoulder Arthroplasty*, Springer International Publishing. Frankle, M., Marberry, S., Pupello, D. (Eds.), Chapter 17: 171-178.

Honors, Awards and Offices Held:

- Medical Provider, U.S. Olympic Team Trials – Swimming and 2016 Omaha Cup, Omaha, NE, June 17-July 3, 2016.
- Emerging Leaders Program, American Orthopaedic Association, June 2015-present
- UNMC
 - > Director, M4 Curriculum Development, 2016-present
 - > Chair, Residency Research Committee, 2016-present
 - > Member, Physicians Leadership Academy, 2015-present
 - > Residency Selection Committee, 2014-present
- Consultant Reviewer:
 - > *Journal of Shoulder and Elbow Surgery*, 2014-present
 - > *Orthopaedics*, 2013-present

OTHER FACULTY

GLEN M. GINSBURG, M.D.

Glen Ginsburg, M.D., is a volunteer associate professor of Orthopaedic Surgery at the University of Nebraska Medical Center. He received his M.D. from the School of Medicine and Biological Sciences at the State University of New York at Buffalo, where he also completed a general surgery residency, as well as his orthopaedic residency training. Dr. Ginsburg completed a pediatric orthopaedic fellowship at the Children's Hospital Los Angeles at the University of Southern California Department of Orthopaedic Surgery. He is a board-certified orthopaedic surgeon. Dr. Ginsburg is the clinical director of the Motion Analysis Laboratory at UNMC's Munroe-Meyer Institute, and serves as an academic advisor to orthopaedic residents in the Department of Orthopaedic Surgery and Rehabilitation. Dr. Ginsburg retired to volunteer associate professor status on March 15, 2011.

WALTER W. HUURMAN, M.D.

Walter W. Huurman, M.D., is a professor emeritus of Orthopaedic Surgery and Pediatrics at the University of Nebraska Medical Center. He received his M.D. from Northwestern University and completed his orthopaedic residency at the U.S. Naval Medical Center in Oakland, California, and the University of California, San Francisco. He completed training in pediatric orthopaedic surgery at the A.I. duPont Institute. A board-certified orthopaedic surgeon, Dr. Huurman has served on the editorial boards of the *American Academy of Pediatrics Journal*, *Pediatrics in Review*, and the *Journal of Pediatric Orthopaedics*. He has served as associate editor of the *Journal of Bone and Joint Surgery*, and on the editorial review boards of the *Journal of the American Academy of Orthopaedic Surgeons* and *Clinical Orthopaedics and Related Research*. Dr. Huurman served as an oral examiner for the American Board of Orthopaedic Surgery (1982, 1986-87, 1990-92, and 1994-2003). He is a member of the Pediatric Orthopaedic Society of North America, the American Academy of Orthopaedic Surgeons, the American Academy of Pediatrics, the North American Spine Society and the American Orthopaedic Association. His areas of concentration include the juvenile spine, clubfoot, and juvenile hip disease, as well as editing pediatric publications. Dr. Huurman retired to professor emeritus status on July 31, 2006.

KODY MOFFATT, M.D.

Dr. Moffatt is the director of Pediatric Sports Medicine at Children's Hospital & Medical Center in Omaha, Nebraska and is an adjunct associate professor in the Department of Orthopaedic Surgery and Rehabilitation and the Department of Pediatrics at the University of Nebraska Medical Center. He is also an associate professor of Pediatrics at Creighton University School of Medicine. Dr. Moffatt received his M.S. in Orthopaedic Surgery and his M.D. from the University of Nebraska Medical Center. He completed his residency training in the Joint CU-UNMC Pediatric Residency Program and joined the university faculty in 2003. He is a Fellow of the American Academy of Pediatrics (AAP) and the American College of Sports Medicine, and is board certified in Pediatrics. Dr. Moffatt was elected to the AAP's Council on Sports Medicine and Fitness Executive Committee. He chairs the Sports Medicine Advisory Committee and serves as physician for state championships for the Nebraska School Activities Association. Dr. Moffatt has received several honors and awards and is a member of numerous professional organizations as well as being published in peer-reviewed journals and text books. His main research interests are in pediatric sports medicine and vaccine medicine.

NEWS

Giving Back to the Community

Department of Orthopaedic Surgery and Rehabilitation faculty, residents and staff dedicate much of their free time to helping advance the UNMC's core values through community outreach and volunteer efforts in the Omaha community and beyond. Over the past two years, department members have had numerous opportunities to donate their time, skills and resources to organizations and people in need, as well as to provide high-quality medical coverage during Omaha's recent sporting events.



Disaster Relief for Nepal

Following the massive 7.8-magnitude earthquake that struck near Nepal's capital city of Kathmandu in May 2015, Miguel Daccarett, M.D., boarded a plane and flew nearly 7,600 miles across the globe to volunteer his time, expertise and supplies. In conjunction with Operation Walk Chicago, Dr. Daccarett performed two or three surgeries each day at the Nepal Orthopedic Hospital, which reported 271 orthopaedic operations in the weeks following the earthquake. As one of the only trauma surgeons at the hospital, Dr. Daccarett mainly saw complex fractures, often already two or three weeks old. ■

FIVB World Grand Prix Volleyball Finals

Several department faculty, resident and staff members volunteered their time to provide medical coverage at the 2015 FIVB Grand Prix Volleyball Finals, which were held in Omaha from July 22-26. This was the first time any U.S. city hosted the FIVB World Volleyball Grand Prix Finals. Nebraska Medicine's Sports Medicine Program provided on-site and on-call medical coverage, including faculty members Beau Konigsberg, M.D., Sean McGarry, M.D., Philipp Streubel, M.D., Mark Dietrich, M.D., Curtis Hartman, M.D., Justin Siebler, M.D., and Matthew Mormino, M.D. Several residents and staff members also volunteered to work at the Sports Medicine Program's booth, talking to national and international visitors, handing out fliers and giveaways and representing the Sports Medicine Program and Orthopaedic Department. ■





Operation Walk USA

Through the department's partnership with Operation Walk USA, two patients received free joint replacements in December from UNMC associate professor and orthopaedic surgeon Curtis Hartman, M.D. Nationally, 80 patients across the country received free joint replacements through Operation Walk USA in 2015. All of these patients would not otherwise be able to get the new joints they so desperately need, due to lack of insurance coverage, financial or other constraints. Operation Walk USA provides all aspects of treatment – surgery, hospitalization, and pre-and post-operative care – at no cost to participating patients. UNMC Orthopaedic faculty members have participated in the program for many years and enjoy the opportunity to give the gift of mobility to these patients each year. ■

U.S. Olympic Team Trials – Swimming

This summer the best swimmers in the country had some of the best medical providers at their service. The 2016 U.S. Olympic Swim Trials were held at the CenturyLink Center in Downtown Omaha from June 26 to July 3. Nebraska Medicine served as the official medical provider for the swim trials and for the Omaha Cup, which was held June 17 and 18. Nearly 150 UNMC and Nebraska Medicine employees volunteered to work in the medical room this year, many of them opting to help out for the second or third time in a row. More than 15 orthopaedic faculty members, clinic staff and academic staff provided both primary medical care to those athletes who did not have medical support traveling with them, as well as a supporting role to the medical teams that traveled with some of the athletes. Nebraska Medicine is no stranger to providing medical support for the country's elite swimmers. The organization also provided medical coverage at the 2008 and 2012 Olympic Swim Trials held in Omaha. ■



The Perry Initiative

The Department of Orthopaedic Surgery and Rehabilitation hosted 40 young women from multiple area high schools in 2015 and 2016 for the annual Perry Outreach Program, a signature event of The Perry Initiative. The program offers a chance for high school-aged women to learn more about pursuing a career in orthopaedics, as well as the opportunity to meet and learn from respected female orthopaedic surgeons and engineers. The daylong outreach event featured interactive workshops where students performed several surgical simulations, including a spinal fusion to correct scoliosis, fixing a broken mid-shaft tibia or femur fracture and reconstructing knee ligaments. Susan Scherl, M.D., professor of pediatric orthopaedic surgery at UNMC, served as organizer of the event. Other volunteers included Maegen Wallace, M.D., Annie Knierim, M.D., Kathleen Grier, M.D., Kim Turman, M.D., Courtney Grimsrud, M.D., Chelsea Bruening, PA, Michelle Craig, PA, Bridget Burke, PA, Mary Otteman, PA, and Raheleh Miralami, Ph.D. candidate. ■



Department Chair to Head Prestigious Orthopaedic Society

Kevin Garvin, M.D., professor and chair of the department has been elected to serve as president of The Hip Society from 2017-2018. Currently the first vice president for the society, Dr. Garvin will join a long list of Hip Society leaders who have made tremendous contributions to the field of orthopaedics. Dr. Garvin's appointment coincides with the society's 50th Anniversary celebration. As such, he will preside over the annual members-only meeting in October 2017 in Omaha. As the sole orthopaedic surgeon representing Nebraska in the society, Dr. Garvin looks forward to hosting his colleagues in Omaha for the first time in the group's history. ■

The Nebraska Medical Center Named Top Hospital in The State

Nebraska Medicine, UNMC's hospital partner, was named the Top Hospital in Nebraska for 2016-17. U.S. News & World Report surveyed nearly 5,000 hospitals across the country to come up with this year's list of Best Hospitals, of which fewer than 150 are nationally ranked. This is the fifth consecutive year the hospital has been designated No. 1 in the state. ■



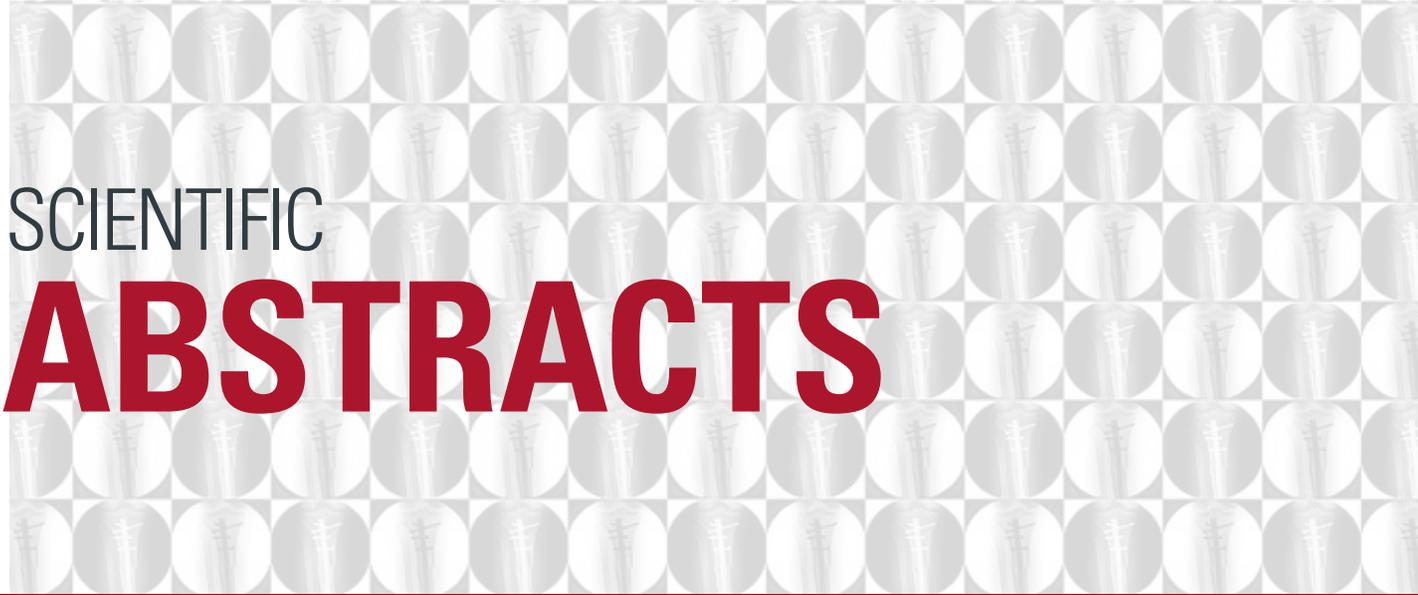
Best Children's Hospital in Orthopedics

Our pediatric clinical partner, Children's Hospital & Medical Center, was recognized by U.S. News and World Report as a Best Children's Hospital in Orthopedics for 2015-2016 and 2016-2017. In 2015-2016, Children's ranked No. 43 of 50 in orthopaedics. In 2016-2017, it ranked No. 46 of 50 in orthopaedics. Both rankings are based on various measures of clinical care, including quality, range of services available, volume, availability of subspecialists and other clinical support in a pediatric setting. ■

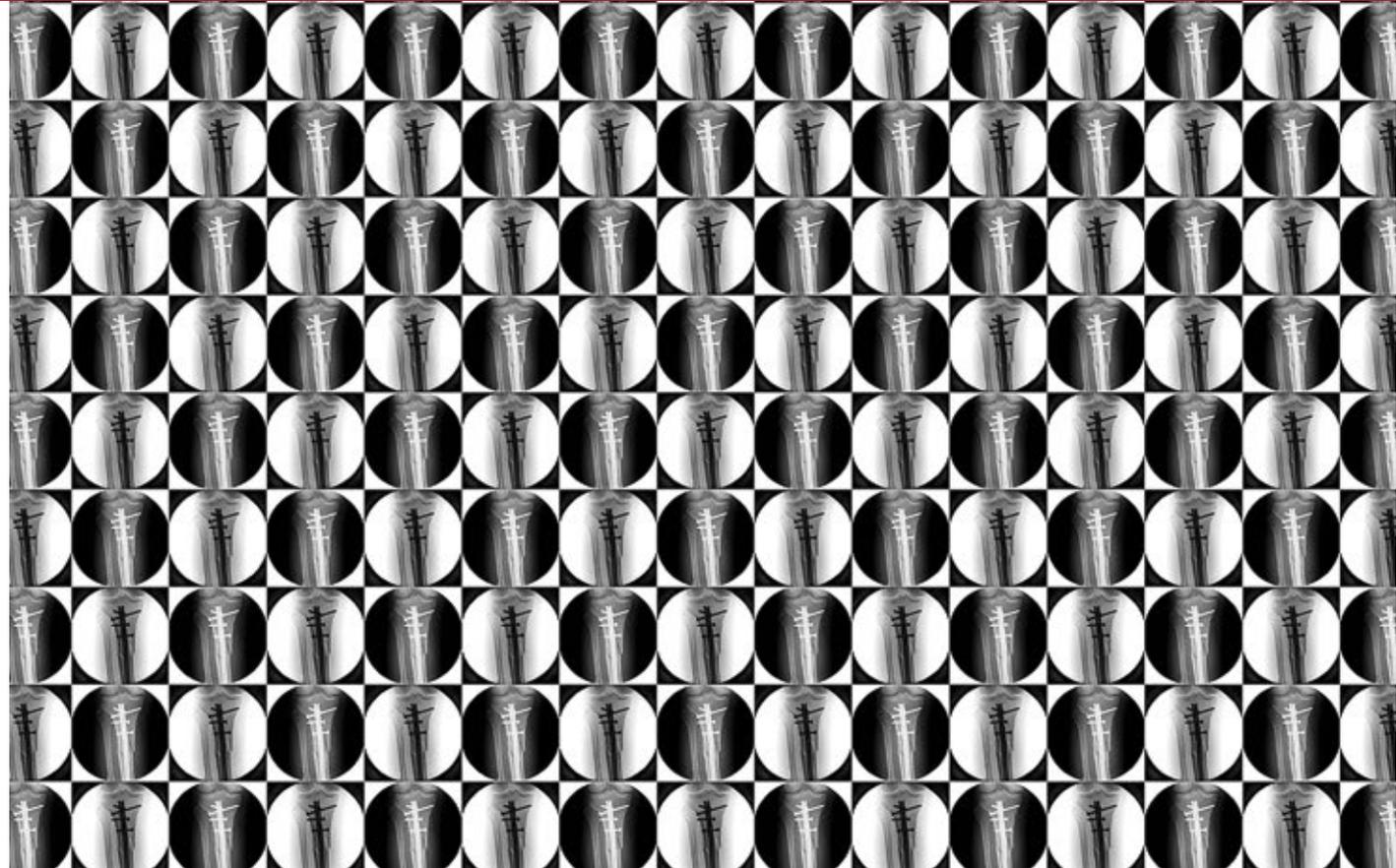


Nebraska Medicine Again Named to 100 Great Hospitals List

For the third straight year, Becker's Hospital Review has named Nebraska Medicine to its prestigious list of "100 Great Hospitals in America," a compilation of some of the most prominent, forward-thinking and focused healthcare facilities in the nation. Hospitals included on the list are home to many medical and scientific breakthroughs, provide best-in-class patient care and are stalwarts of their communities, serving as research hubs or local anchors of wellness. ■



SCIENTIFIC
ABSTRACTS



Low Wear Rates Seen in THAs With Highly Crosslinked Polyethylene at 9 to 14 Years in Patients Younger Than Age 50 Years

Kevin L. Garvin, Tyler C. White, Anand Dusad, Curtis W. Hartman, John Martell

With kind permission from Springer US: *Clinical Orthopaedics and Related Research*®, *Low Wear Rates Seen in THAs With Highly Crosslinked Polyethylene at 9 to 14 Years in Patients Younger Than Age 50 Years*, 473(12), 3829-3835, December 2015, Authors: Garvin, K.; White, T.; Dusad, A.; Hartman, C.; Martell, J.; Tables 1-2; Figures 1A-1B.

Symposium: 2014 International Hip Society Proceedings

BACKGROUND:

Patients 50 years or younger are at high risk for wear-related complications of their total hip arthroplasty (THA) because of their generally higher levels of activity. Highly crosslinked polyethylene (HXLPE) is believed to be more durable for this population than conventional polyethylene because of its improved wear; however, limited information is available on the wear of HXLPE in this population, particularly the wear of HXLPE when it articulates with alternative bearings like Oxinium (Smith & Nephew, Memphis, TN, USA).

QUESTIONS/PURPOSES

The purpose of this study was to evaluate two questions relative to this population of patients undergoing THA. First, what was the linear and volumetric wear rate of HXLPE in patients 50 years or younger at a minimum followup of 9 years and was osteolysis observed in any of these hips? Given the potential for damage to the Oxinium femoral head surface, was the wear of HXLPE in the patients with this material similar to the other bearings or was there accelerated or runaway wear that was visible in any of the patients?

METHODS

From November 1999 to April 2005, 105 THAs were performed in 95 patients 50 years of age or younger (mean, 42 years; range, 20–50 years). The mean body mass index was 30 kg/m² (range, 17–51 kg/m²). The mean followup was 12 years (range, 9–14 years). Two patients died, five patients (one bilateral) were lost to followup, and one hip was revised elsewhere for pain. The patients' information was not included in the study, which left 87 patients with 96 hips for analysis. Highly crosslinked polyethylene was the acetabular bearing for all of the hips. We analyzed the linear and volumetric wear of all of the hips using the Martell method. Eighty hips had the same diameter head (28 mm) allowing us to more accurately compare the different bearing materials. The type of femoral head used was related to our sequential use of materials beginning with cobalt chrome (14), ceramic (23) followed by Oxinium (43) in the hips with 28-mm heads. Although cobalt-chrome was used early in this study, our previous experience with ceramic on polyethylene encouraged us to use it as an alternative bearing. The Oxinium was used consecutively for the remaining hips.

RESULTS

The mean wear of the HXLPE after 1 year of bedding-in (true linear wear) was 0.022 mm/year (95% confidence interval [CI], 0.015–0.030 mm/year). The mean volumetric wear of HXLPE after 1 year of bedding-in (true volumetric wear) was 9 mm³/year (95% CI, 4–14 mm³/year). None of the hip radiographs had evidence of loosening or osteolysis. Wear was not associated with femoral head material ($p = 0.58$ for linear wear/year versus head material and $p = 0.52$ for volumetric wear/year versus head material).

CONCLUSIONS

In our study of patients 50 years of age or younger undergoing THA, the linear and volumetric wear rates of HXLPE were very low regardless of the bearing surface material. The laboratory concerns of Oxinium surface damage are serious but at this time we have not seen high wear of the HXLPE or osteolysis in this population.

LEVEL OF EVIDENCE

Level III, therapeutic study.

TABLE 1: WEAR OF HXLPE FOR 28 MM FEMORAL HEAD BEARINGS

	Ceramic	Oxinium	Cobalt Chrome
Median linear wear mm/yr*	0.011 [CI] 0.04 - 0.04	0.022 [CI] 0.015 - 0.033	0.024 [CI] -0.002 - 0.04
Median volumetric wear mm/yr**	2.01 [CI] 0.36 - 18.90	10.2 [CI] 4.8 - 14.5	9.0 [CI] 2.5 - 24.1

*Kruskal-Wallis test $p=0.58$ for linear/yr vs. head material

**Kruskal-Wallis test $p=0.52$ for volume/yr vs. head material

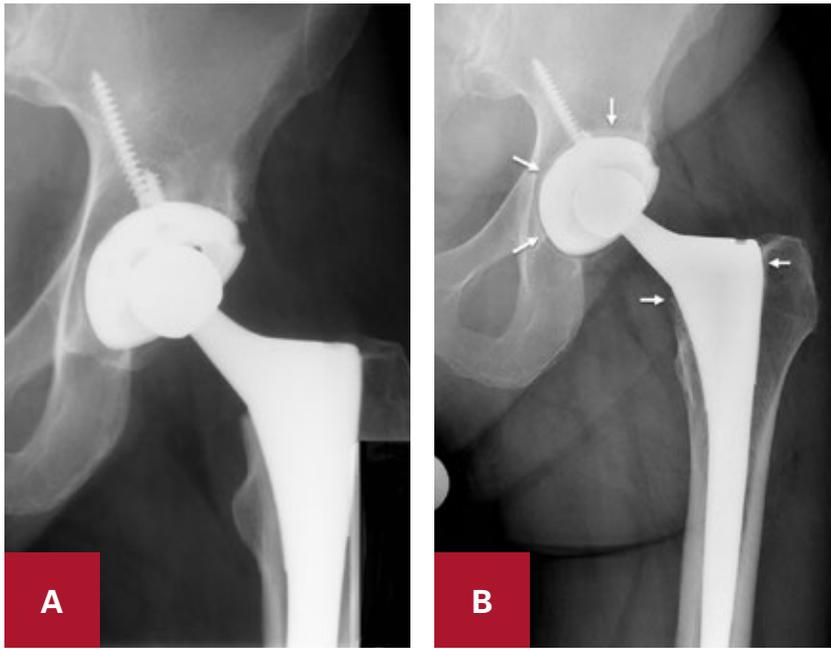


Fig. 1A–B (A) The figure is an AP pelvis radiograph obtained 6 weeks after THA in a 47-year-old woman. **(B)** The figure is an AP pelvis radiograph obtained 12 years after THA. The radiolucencies are evident (arrows) around the acetabular component and the proximal femoral component in Zone 1 and Zone 7.

TABLE 2: THE RESULTS USING HIGHLY CROSS-LINKED POLYETHYLENE: A FOLLOW-UP INTERVAL OF 10 YEARS IN PATIENTS UNDER 50 YEARS (TOP) AND OVER 50 YEARS (BOTTOM)

Patients 50 years of Age or Younger

Authors/Year	Pts/Hips	Bearing Type	Mean Age at Index	Length of F/U	Number Revised	Wear mm/yr	Complications
Kim et al* 2013[25]	57/67	Alumina HXLPE	28 (30 & under)	11 yrs	0	0.031 ± 0.004 (includes bedding-in period)	1 dislocation
Babovic & Trousdale et al** 2013[1]	50/54	CoCr HXLPE	39 (50 & under)	Min 10 yrs	1	0.02 ± 0.0047 (did not state if includes bedding-in period)	1 dislocation
Current study** 2015	95/105	CoCr, oxidized zirconium & ceramic HXLPE	42 (50 & under)	12 (9-14 yrs)	1	0.022 (95% CI 0.015 - 0.030) (excludes bedding-in)	3 intra-op fx 1 DVT
Kim et al* 2013[24]	100 pts	C on C Ceramic on HXLPE	44 (50 & under)	12 yrs (min 11)	1	0.031 ± 0.004 (includes bedding-in period)	5% squeaking or clicking hips
Kim et al* 2011[22]	76/79	Alumina HXLPE	46	9 (7-9 yrs)	0	0.05 ± 0.02 (includes bedding-in period)	1 dislocation

Patients over 50 years of Age

Ranawat*** 2012[37]	91/112	CoCr HXLPE	52 (21-65)	6 yrs (5-7.7)	0	0.043 (±28)	NR
Johanson et al 2012[21]****	51/52	CoCr & HXLPE CoCr & conv PE (Durasul)	55	10 yrs	1 ea group	RSA	5/61 stem (8%) revision
Bedard & Callaghan* 2014[2]	139/150	CoCr HXLPE	56 (25-91)	Min 10 yrs	0	0.05 (includes bedding-in period)	0
Bragdon et al*** 2013[4]	159/174	CoCr HXLPE	60	7-13	NR	Min 7 yr f/u: 0.018 0.079 Min 10 yr f/u: 0.01 0.0562 (excludes 1 yr bedding-in period)	0
Engh et al* 2012[12]	116/116	CoCr vs HXLPE or conv Poly	63	10.0 ± 1.8	None for wear in the HXLPE group 2 for dislocation	0.04 ± 0.06 (includes bedding-in period)	2 dislocations
Garcia-Rey et al* 2013[14]	45/45	CoCr HXLPE	67	Min 10 yrs	0	0.02 ± 0.016 (includes bedding-in period)	NR
Thomas et al ** 2015[17]	39/39	CoCr HXLPE	68 (52-76)	Min 10 yrs	0	0.033	NR

Methods of crosslinking:

* 5 Mrad of gamma irradiation and heated; sterilized with gas plasma (Marathon, DePuy, Warsaw, IN, USA)

** 10 Mrad of gamma beam irradiation and heat treated; sterilized with gas plasma (Longevity, Zimmer, Warsaw, IN, USA)

*** 7.5 Mrad irradiation and heat treated; sterilized xto 3 Mrad in nitrogen (Crossfire, Stryker, Kalamazoo, MI, USA)

**** 9.5 Mrad of electron-beam irradiation, melted and annealed; sterilized in ethylene oxide (Durasul, Zimmer, Inc, Warsaw, IN, USA)

Would a Polyethylene Femoral on a Metallic Tibial Component Wear Excessively in a Knee Replacement?

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In conventional knee replacement designs, the convex metallic femoral component surfaces articulate against concave UHMWPE tibial bearing surfaces. If the reverse was possible, where the femoral component was convex plastic and the tibial bearing was metallic and concave, this would open up possibilities to inset UHMWPE bearings (alone or metal backed) into damaged areas of femoral cartilage to articulate against simple well-fixed all metallic monoblock tibial components. Among the advantages are reduced resection of strong bone from the proximal tibia for more durable fixation. It paves the way to flexibility, simplicity with less modular parts and load sharing with the native articular cartilage on the femoral side. However, would excessive wear of such a “reversed” (plastic on metal) bearing couple be an obstacle against such innovations? We hypothesized that with a newly designed conservatively shaped unicompartmental knee, the wear of the reversed materials would be comparable to normal bearings. We set out to design such a knee, test its wear and compare it to the conventional (non-reversed) material configuration.

A novel unicompartmental knee replacement (designed by the second author) has a metal-backed UHMWPE femoral component (Figs. 1 & 2) to articulate against a monoblock metallic tibial component (Fig. 3). The femoral component resurfaces the distal end of the femur to a flexion arc of only 42°, the area of cartilage loss in early osteoarthritis (Fig. 4). We compared this to the same design but with the usual arrangement of femoral metal and tibial plastic (standard design shown in Fig. 2 & 3).

Most knee simulators are designed for total knee replacement (TKR) for which there is an ISO testing standard, but there is no standardized method for testing wear of unicompartmental knees. The test was conducted on a 4-station Instron-Stanmore force-controlled knee simulator. Both specimen groups (n=4 each) were highly crosslinked UHMWPE stabilized with vitamin E. On each of the four stations, one uni was mounted on the medial side and one on the lateral, as if a standard TKR was being tested. The ISO walking cycle force-control waveforms were applied for 5 million cycles (Mc) at 1Hz, but with the maximum flexion during the swing phase (usually 58°) curtailed to 35° to maintain the contact within the arc of the femoral component. In-vivo this implant would be inlaid into the distal medial femoral condyle and the articulating surface immediately transitions into native cartilage. In our test set-up there was no secondary surface as such. The reduced flexion was only during the swing phase where compressive load was low and the effect on wear would be negligible. Wear was measured gravimetrically at many intervals and corrected by the weight gain of extra two active soak controls per group.

After 5 Mc, the average rates of gravimetric weight loss from the UHMWPE femoral and tibial bearings were 4.73 ± 0.266 mg/Mc and 3.07 ± 0.388 mg/Mc, respectively (statistically significantly different, $p = 0.0007$) (Fig. 5). No significant difference was found in wear between medial and lateral placement of the same implant, although the medial side generally wore more. Although the plastic femorals of the reverse design wore more than the plastic tibials, the wear was still relatively low at <5 mg/Mc. The range for UHMWPE wear of typical TKRs, tested under the same conditions in our laboratory has been 2.85–24.1 mg/Mc. Even if the wear rate we measured for the reversed materials uni tested here was doubled (approx. 10 mg/Mc) for a supposed uni on both the medial and lateral sides, the wear would still be in the lower half of the TKR wear range.

The more realistic and fair comparison is between the projected wear of only one uni versus a total knee replacement. After all, patients would have a uni installed only because they need a uni and not a total, except in rare circumstances. Viewed as such, wear of the reverse material configuration design tested here would be even less of a concern. The wear results from this study showed the reversed materials ‘early intervention’ unicompartmental knee design which is promising of a fundamental advance with the advantages mentioned earlier, to be worthy of verification in clinical tests.



1

Fig 1: Views of a plastic femoral component from the reversed materials design.



2

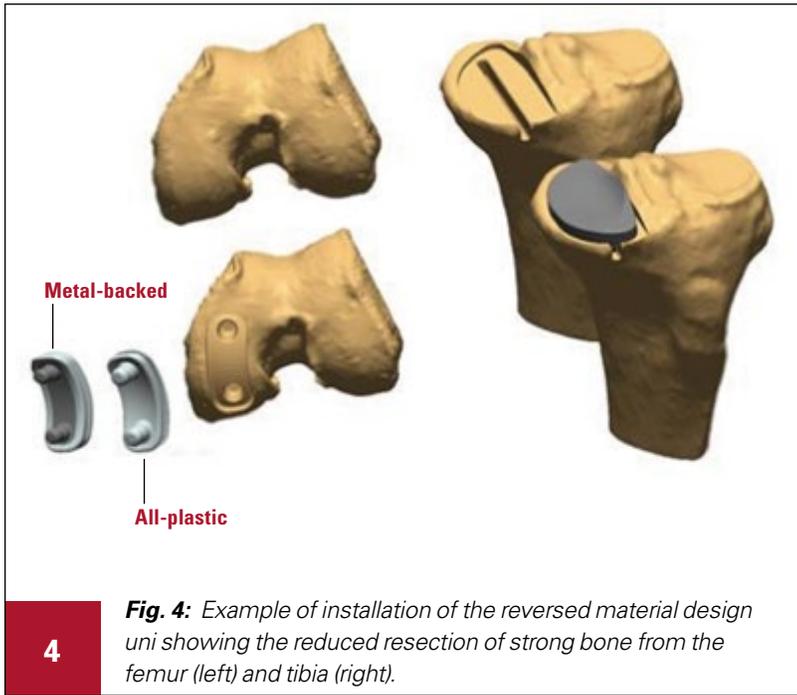
Fig 2: Views of the metallic femoral components. A baseplate for the plastic femoral components (reversed materials design) is shown on the left, and the all-metal femoral component (standard material couple) is shown on the right.



3

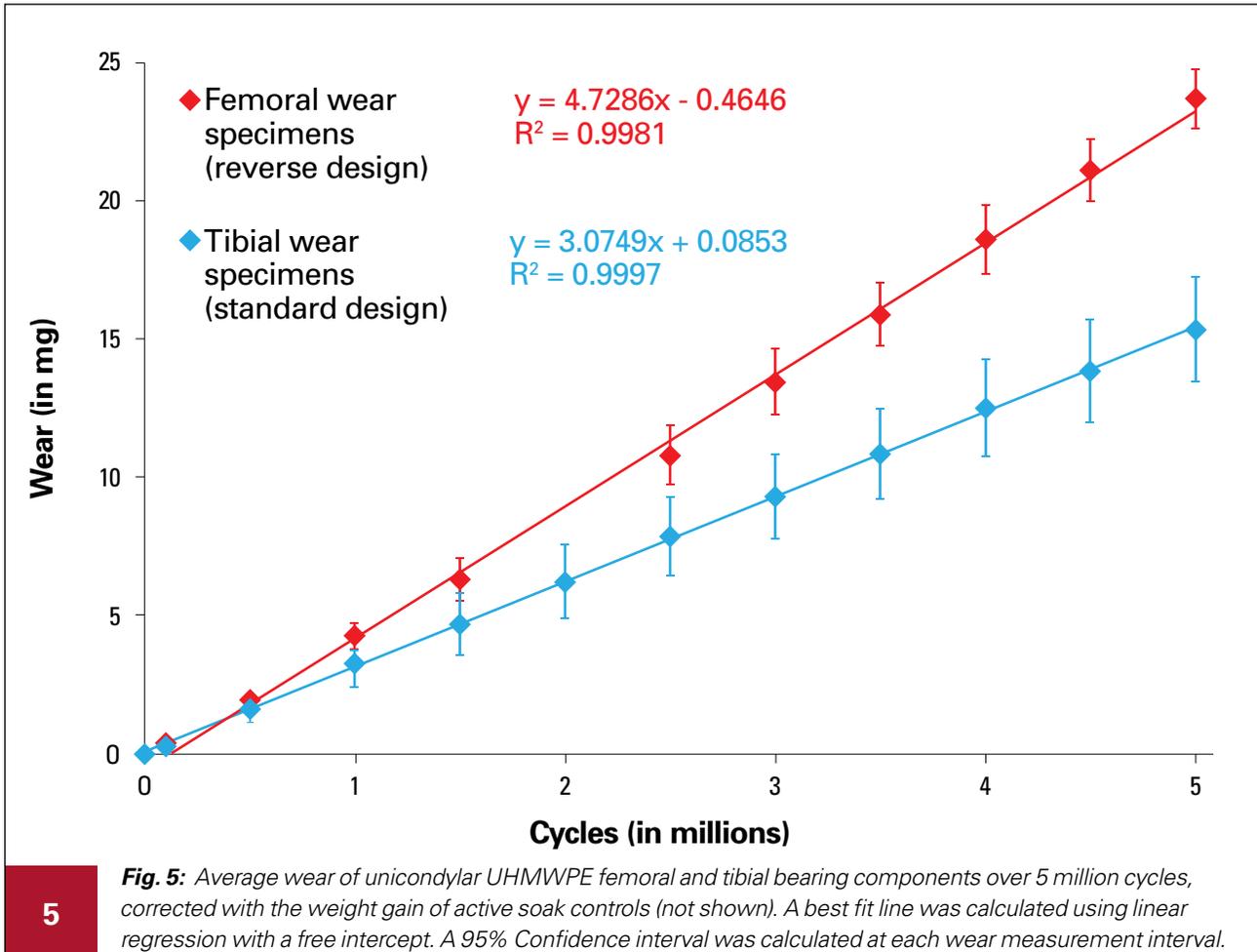


Fig 3: Top: views of a metal tibial monoblock component from the reversed materials design. Bottom: views of a plastic tibial bearing (standard material couple).



UNICONDYLAR KNEE WEAR TEST

Averaged data, corrected via active soak controls, least squares error lines and 95% confidence intervals shown



Human Synovial Fluid versus Bovine Calf Serum: A Hip-Load of Friction

Hani Haider, Joel N. Weisenburger, Kevin L. Garvin

Reducing bearing friction in orthopedic joint replacements is useful. Less friction usually means less adhesion in articulation, less energy dissipation and wear reduction which is crucial to the long term survival of the implant. High friction has also been associated with implant failure due to loosening, especially in metal-on-metal hips. Further still, high friction has also been a suspect in causing the trunnion corrosion at the head-taper interface in total hip replacements. This corrosion or high wear of metallic surfaces can cause an increase in metal ions, which can cause metallosis, and especially severe symptoms in metal sensitive patients. The lubricant plays a major role in the in vitro testing of friction and wear of total joint replacements. In the body, synovial fluid is the naturally occurring lubricant, and therefore finding a lubricant that is similar to human synovial fluid is necessary for accurate in vitro testing of implants. Only such a surrogate lubricant, rather than actual human synovial fluid, can be used in in vitro testing as it is infeasible to collect and preserve a sufficient quantity of synovial fluid. It is widely accepted that bovine calf serum is a good surrogate lubricant, as it is thought that the protein content and frictional properties of bovine calf serum closely resemble those of human synovial fluid. However, little testing has been done to compare the frictional properties of bovine calf serum and human synovial fluid under both physiologically relevant hip pressures and sliding speeds.

Bovine calf serum (SAFC Biosciences, Lenexa, KS) diluted with DI water to two different protein concentrations (15 g/L, and 30 g/L) and pure undiluted serum (71 g/L) as well as human synovial fluid were used as lubricants in friction testing (37°C for all). The human synovial fluid was harvested at the time of total knee replacement surgery at the University of Nebraska Medical Center from six different patients (IRB approved). Ultra-high molecular weight polyethylene pins were machined from GUR 1050 bar stock (conventional, non-crosslinked material, Orthoplastics, England). The pins were 6 mm in diameter, and 19mm in length. Highly polished CoCrMo disks (Ra: $0.04 \pm 0.01 \mu\text{m}$, verified with an Ambios non-contact interferometer) were rotated underneath the pins on a custom-built friction machine (Figure 1). The friction machine had two dedicated load cells, one to measure the axial compressive load, and another to measure the frictional torque. As a pin was pressed against a disk at a known distance from the disk center (9.5 mm) and as the disk was rotated, the pin would “want” to move in the direction of disk rotation due to contact with the disk. This pin assembly movement was allowed by an advanced frictionless air bearing (unique to this custom machine), but was prevented by an adjustable lever arm that connected to a torque cell. With a known lever arm length 665 mm, the frictional force was computed dynamically, and divided by the axial load to determine the friction coefficient in real time. The pin samples were pressed against the disks with 5 MPa (~140 N), which is in the anatomic range for hip replacements (and 500x higher than the only other similar friction study we could find [1]). One experiment with bovine serum at 30 g/L was conducted at 2 MPa as well. For all experiments, N=3 except for the human synovial fluid test, which was N = 6. The samples were tested at two sliding speeds, 0.05 mm/s to measure the static “break away” friction coefficient, and 20 mm/s to measure the dynamic friction coefficient (20 mm/s is within the anatomic sliding speed range for a 40mm diameter hip replacement). In the static test the maximum friction coefficient was recorded, and in the dynamic test the friction coefficient was averaged over a 3-minute test period from 1800 measurements taken 10 times a second.

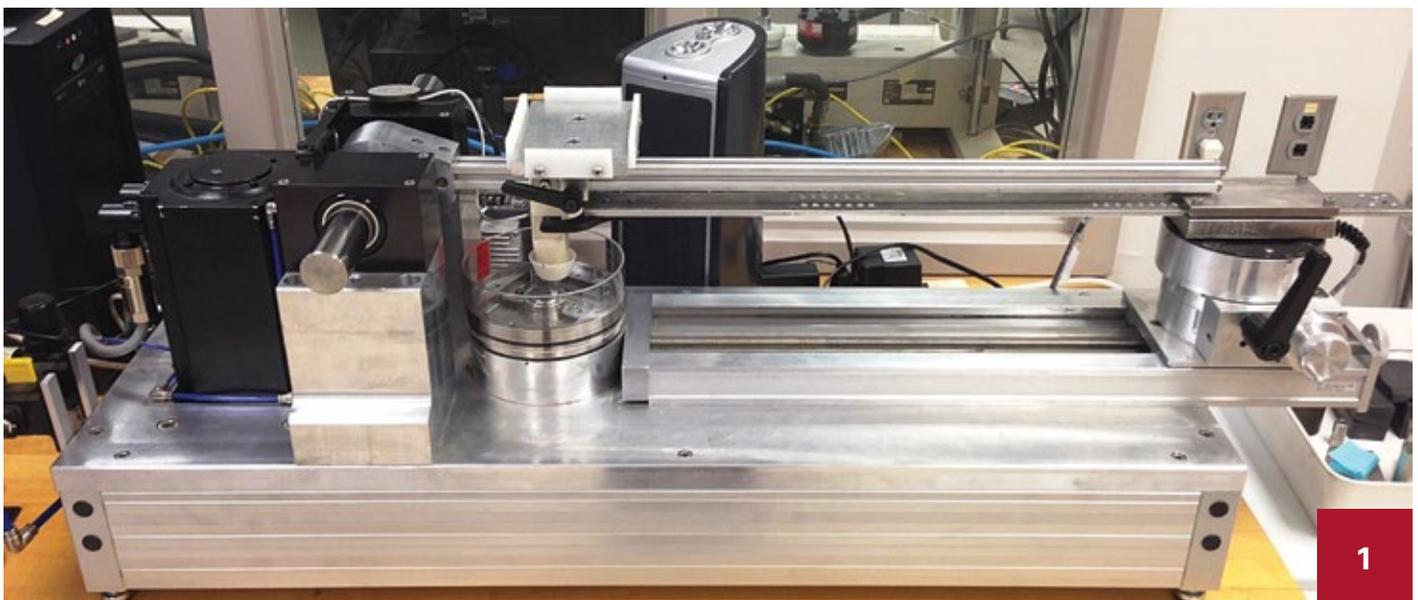


Figure 1: The friction machine, built in-house at UNMC.

The friction coefficient results are shown in Figure 2. In all cases, the static friction coefficient was higher than the dynamic friction coefficient, as was expected. In the static test, the only significant difference in friction coefficient was between the serum diluted to 15 g/L protein (0.101 ± 0.008) and the much lower friction synovial fluid (0.033 ± 0.006 , $p = 0.047$). In the dynamic tests with standard serum (30 g/L protein), the higher 5 MPa stress test naturally showed higher frictional forces due to higher stresses, but resulted in a lower dynamic friction coefficient than the same test at 2 MPa (0.036 ± 0.006 , 0.056 ± 0.004 , respectively, $p = 0.012$). At 5 MPa, the standard serum showed no difference in friction when compared to the diluted serum ($p = 0.877$), but showed higher friction than the pure undiluted serum ($p = 0.031$) and the synovial fluid ($p = 0.019$). Pure undiluted serum showed similar static friction to the synovial fluid (0.057 ± 0.030 , 0.033 ± 0.006 respectively, $p = 0.417$), and on average higher dynamic friction but not statistically significantly so (0.022 ± 0.003 , 0.020 ± 0.005 respectively, $p = 0.673$).

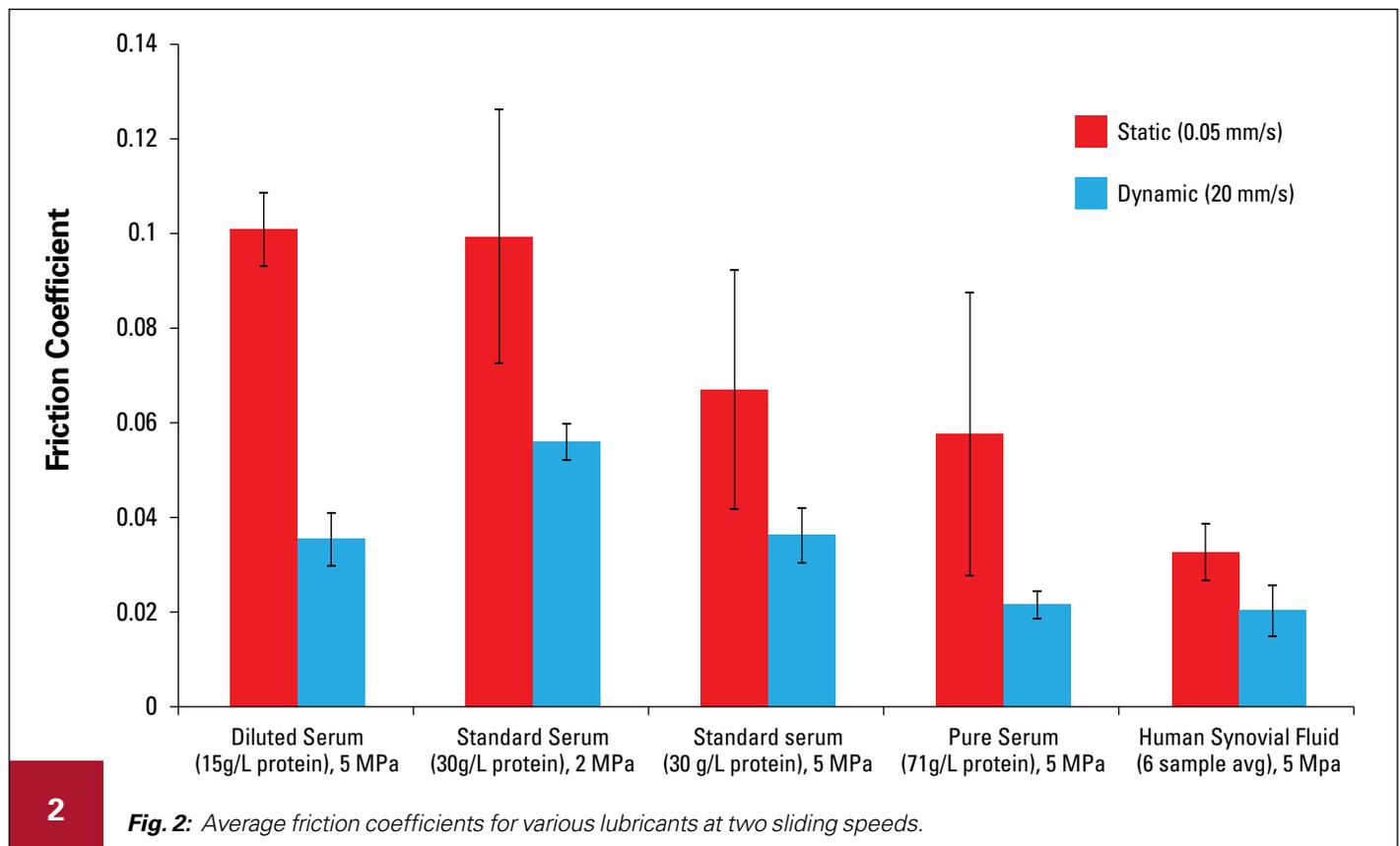
It was interesting that the increasing the contact pressure from 2 MPa to 5 MPa caused a modest drop in friction coefficient. The latter should be viewed as the frictional force per unit compressive load, and so raising stress (load in this case) may not proportionately raise friction with the presence of protein and liquid film lubricant. In general, increasing the protein concentration of the serum resulted in a reduced friction coefficient, approaching the measured friction value of synovial fluid in the case of the pure, undiluted serum. The synovial fluid showed very low friction coefficients in both the static and dynamic tests. It appears that synovial fluid out-performs bovine calf serum in terms of friction. This helps us for in vitro wear testing of joint replacements with diluted bovine serum being closer to a “worst case scenario” as far as lubrication is concerned, or at least sub-optimal. It may also mean that joint replacements are faring better in vivo friction wise at least than most in vitro testing with diluted bovine serum. Therefore, if fretting and galvanic corrosion of the modular junction is attributed to higher friction of larger hips, in vitro testing should be able to simulate, capture and screen for such patient risks if appropriate in vitro tests are conducted.

A new friction measurement machine was introduced in which we were able to simulate and measure friction with physiologically relevant pressures and sliding speeds that hip implants must endure. Our results showed that human synovial fluid outperforms any diluted bovine aserum in how little friction it produces with CoCrMo metallic alloy and UHMWPE bearing couple materials. Once diluted, bovine calf serum therefore is safe and cannot under-simulate friction during in vitro UHMWPE on CoCr.

1. Yao, J.Q. et al. (2003). The influences of lubricant and material on polymer/CoCr sliding friction. *Wear*. 255(1-6), 790-784.

STATIC AND DYNAMIC FRICTION COEFFICIENT OF UHMWPE PINS AGAINST CoCrMo DISKS WITH DIFFERENT LUBRICANTS

(N=6 for human synovial fluid, all others N=3, average data, standard deviation bars shown)



Bacterial Spine Infections in Adults: Evaluation and Management

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With kind permission from Wolters Kluwer: *Journal of the American Academy of Orthopaedic Surgeons*, Bacterial Spine Infections in Adults: Evaluation and Management, 24(1), 11-18, 2016, Authors: Cornett, C.; Vincent, S.; Crow, J.; Hewlett, A.

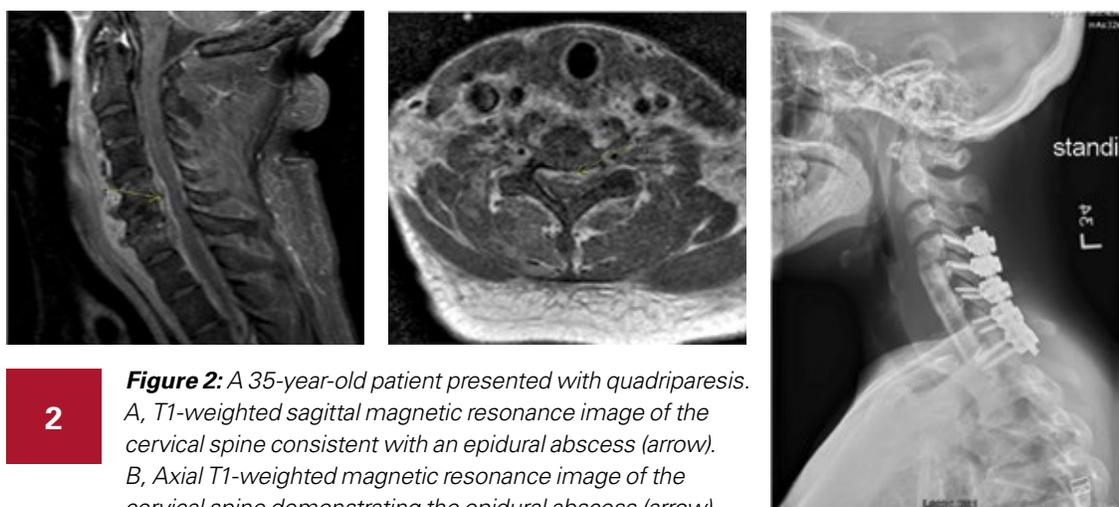
ABSTRACT:

Bacterial spinal infections in adults can have notable adverse consequences, including pain, neurologic deficit, spinal instability and/or deformity, or death. Numerous factors can predispose a person to spinal infection, many of which affect the immune status of the patient. These infections are typically caused by direct seeding of the spine, contiguous spread, or hematogenous spread. Infections are generally grouped based on anatomic location; they are broadly categorized as vertebral osteomyelitis, discitis, and epidural abscess. In some cases, the diagnosis may not be elucidated early without a reasonable index of suspicion. Diagnosis is based on history and physical examination, laboratory data, proper imaging, and culture. Most infections can be treated with an appropriate course of antibiotics and bracing if needed. Surgical intervention is usually reserved for infections resistant to medical management, the need for open biopsy/culture, evolving spinal instability or deformity, and neurologic deficit or deterioration.



1

Figure 1: A 58-year-old man presented with neck and arm pain with weakness in the upper extremities. A, Preoperative sagittal CT image of the cervical spine demonstrating C5 through C7 osteomyelitis and kyphosis. Postoperative lateral (B) and AP (C) radiographs after multilevel corpectomy and anterior-posterior fusion with instrumentation. Note the restoration of alignment. Neuralgic symptoms and pain resolved postoperatively.



2

Figure 2: A 35-year-old patient presented with quadriparesis. A, T1-weighted sagittal magnetic resonance image of the cervical spine consistent with an epidural abscess (arrow). B, Axial T1-weighted magnetic resonance image of the cervical spine demonstrating the epidural abscess (arrow). C, Postoperative lateral radiograph after multilevel corpectomy and anterior-posterior fusion with instrumentation and fibula strut. The patient made complete neurologic recovery over 6 weeks.

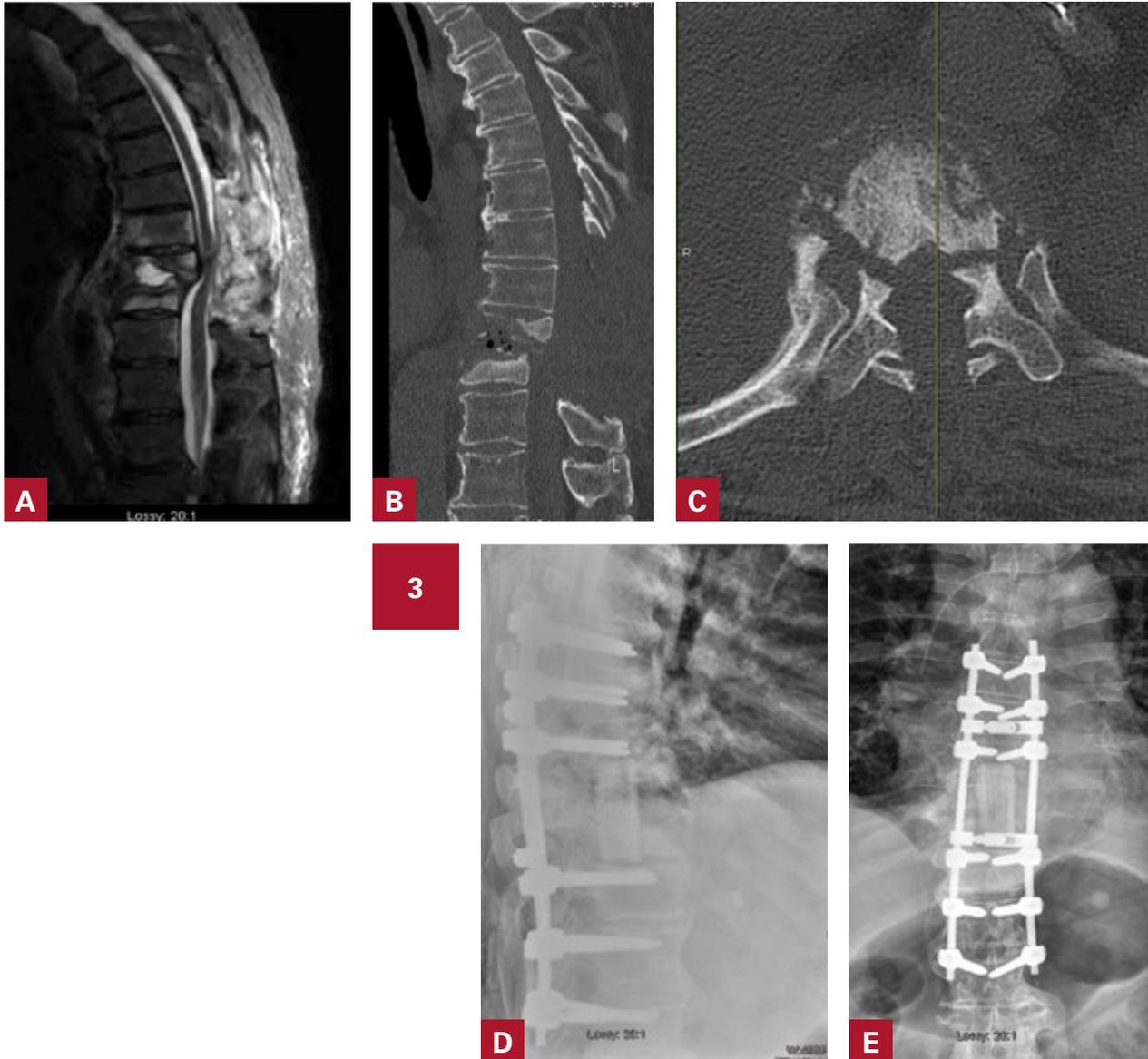


Figure 3: A 50-year-old man presented with a 3-week history of marked lower extremity weakness and inability to ambulate after a previous laminectomy only, performed for osteodiscitis with notable anterior bone destruction. A, Sagittal T2-weighted magnetic resonance image of the thoracic spine demonstrating notable osteodiscitis with multilevel laminectomy. B, Sagittal (B) and axial (C) CT images of the thoracic spine demonstrating fracture through pedicles after laminectomy only. Lateral (D) and AP (E) postoperative radiographs demonstrating reduction and posterior fusion with instrumentation and multilevel thoracic corpectomy with allograft strut. The patient regained ambulatory status postoperatively within 6 months.

Revision of failed humeral head resurfacing arthroplasty

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With kind permission from Wolters Kluwer – Medknow: *International Journal of Shoulder Surgery*, Revision of failed humeral head resurfacing arthroplasty, 10(1), 21–27, Jan-March 2016, Authors: Streubel, P.; Simone, J.; Cofield, R.; Sperling, J.

PURPOSE:

The purpose of this study is to assess the outcomes of a consecutive series of patients who underwent revision surgery after humeral head resurfacing (HHR). Our joint registry was queried for all patients who underwent revision arthroplasty for failed HHR at our institution from 2005 to 2010. Eleven consecutive patients (average age 54 years; range 38–69 years) that underwent revision of 11 resurfacing arthroplasties were identified. The primary indication for resurfacing had been osteoarthritis in six, glenoid dysplasia in two, a chondral lesion in two, and postinstability arthropathy in one patient. The indication for revision was pain in 10 and infection in one patient. Seven patients had undergone an average of 1.9 surgeries prior to resurfacing (range 1–3).

MATERIALS AND METHODS:

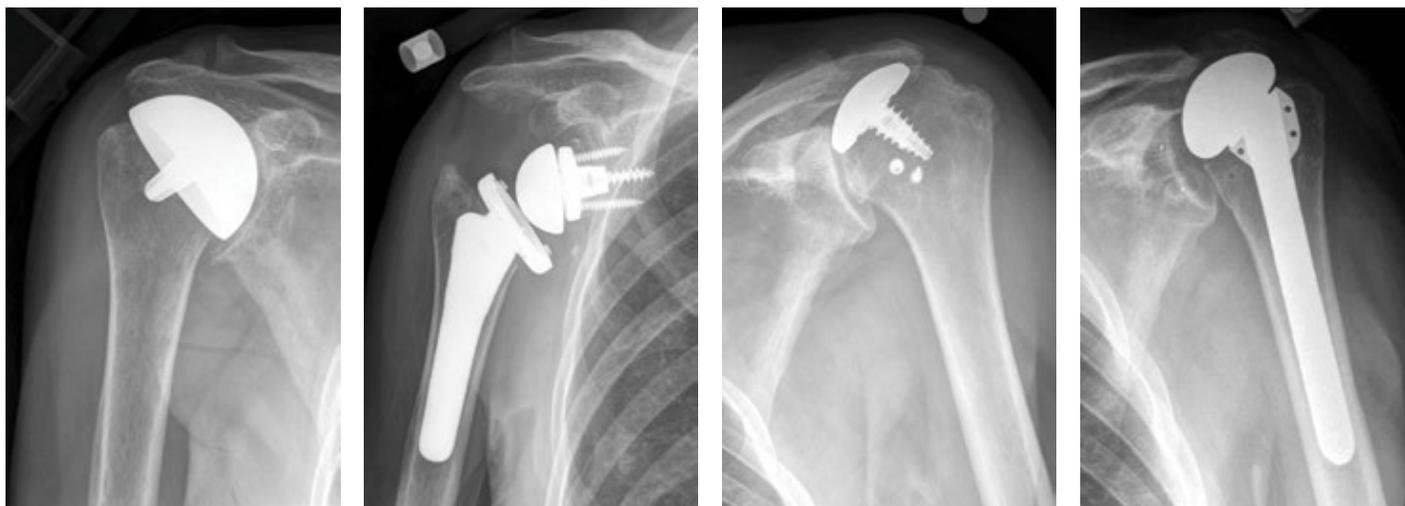
All patients were revised to stemmed arthroplasties, including one hemiarthroplasty, two reverse, and eight anatomic total shoulder arthroplasties at a mean 33 months after primary resurfacing (range 10–131 months). A deltopectoral approach was used in seven patients; four patients required an anteromedial approach due to severe scarring. Subscapularis attenuation was found in four cases, two of which required reverse total shoulder arthroplasty. Bone grafting was required in one glenoid and three humeri.

RESULTS:

At a mean follow-up of 3.5 years (range 1.6–6.9 years), modified Neer score was rated as satisfactory in five patients and unsatisfactory in six. Abduction and external rotation improved from 73° to 88° ($P = 0.32$) and from 23° to 32° ($P = 0.28$) respectively. Reoperation was required in two patients, including one hematoma and one revision for instability.

CONCLUSION:

Outcomes of revision of HHR arthroplasty in this cohort did not improve upon those reported for revision of stemmed humeral implants. A comparative study would be required to allow for definitive conclusions to be made.



1

Figure 1: Case 11. (a) Anteroposterior view prior to revision of a complete humeral head resurfacing hemiarthroplasty. An oversized implant had been placed, impinging on the rotator foot print. (b) Due to severe rotator cuff deficiency, revision with a reverse total shoulder arthroplasty was performed.

2

Figure 2: Case 5. (a) Anteroposterior view prior to revision of a partial humeral head resurfacing hemiarthroplasty in a patient with previous history of rotator cuff repair. (b) Radiographs at 26 months of follow-up show an anatomic total shoulder arthroplasty without signs of loosening but with significant superior migration of the humeral component.

Highly controlled coating of strontium-doped hydroxyapatite on electrospun poly (-caprolactone) fibers

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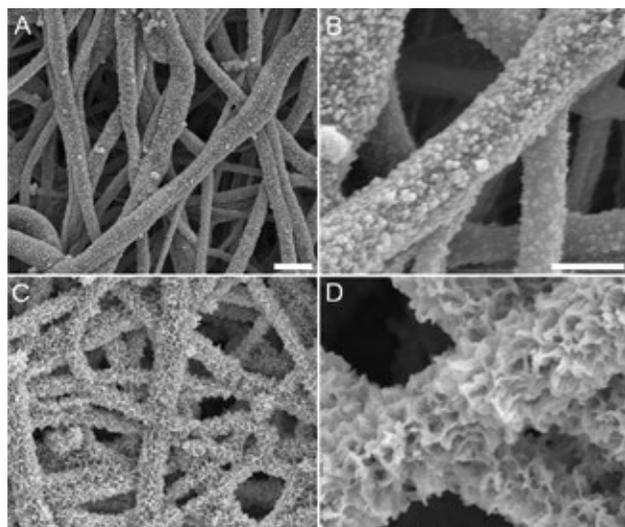
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With kind permission from Wiley Periodicals, Inc.: *J Biomed Mater Res Part B: Appl Biomater*, Highly controlled coating of strontium-doped hydroxyapatite on electrospun poly(-caprolactone) fibers. 2016, Authors: Weng, L.; Teusink, M.; Shuler, F.; Parecki, V.; Jingwei, X; Figures 4,6.

ABSTRACT:

Electrospun fibers show great potential as scaffolds for bone tissue engineering due to their architectural biomimicry to the extracellular matrix (ECM). Cation substitution of strontium for calcium in hydroxyapatite (HAp) positively influences the mechanism of bone remodeling including enhancing bone regeneration and reducing bone resorption. The objective of this study was to attach strontium-doped HAp (SrHAp) to electrospun poly(-caprolactone) (PCL) fibers for creation of novel composite scaffolds that can not only mimic the architecture and composition of ECM but also affect bone remodeling favorably. We demonstrated for the first time the highly controlled SrHAp coatings on electrospun PCL fibers. We showed the reproducible manufacturing of composite fiber scaffolds with controllable thickness, composition, and morphology of SrHAp coatings. We further showed that the released strontium and calcium cations from coatings could reach effective concentrations within 1 day and endure more than 28 days. Additionally, the Young's modulus of the SrHAp-coated PCL fibers was up to around six times higher than that of raw fibers dependent on the coating thickness and composition. Together, this novel class of composite fiber scaffolds may hold great promise for bone regeneration.

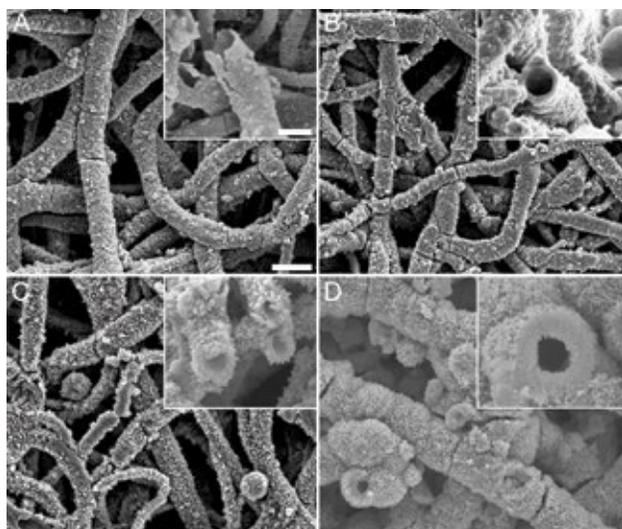


4

Figure 4: SEM images show the morphologies of strontium-doped mineral coatings on PCL fibers affected by temperature. PDP-PCL fibers were placed in 10 X SBF (Sr/Ca = 0.5/0.5) containing 0.04M NaHCO₃ at 40°C (A, B [highly magnified image of panel A]) and 37°C [C, D (highly magnified image of panel C)] for 12 h statically. The scale bar in (A, C): 2 μm. The scale bar in (B, D): 1 μm.

6

Figure 6: SEM images show the tunable thickness of strontium-doped mineral coatings on PCL fibers by simply adjusting coating times: (A) once; (B) twice; (C) three times; and (D) four times. PDP-PCL fibers were placed in 10 X SBF (Sr/Ca = 0.5/0.5) solution containing 0.04M NaHCO₃ at room temperature for 8 h statically. For multiple coatings, the sample was washed and placed in a fresh 10 X SBF solution for additional 8 h. Insets are highly magnified images of the corresponding images. The scale bar: 2 μm. The scale bar in the insets: 1 μm.



Long-term Outcomes and Satisfaction of Rotationplasty Patients in the Treatment of Lower Extremity Sarcomas: A Second Stage Cost Analysis of Rotationplasty and Expandable Megaprosthesis

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BACKGROUND:

There are many different options for restoration of function in the treatment of lower extremity sarcomas in younger children. Options for functional reconstruction include: expandable endoprosthetics, osteoarticular or intercalary allografts, allograft prosthetic composites, amputation with traditional prosthetics and rotationplasty with custom below-knee prosthetics. The use of each option has its advantages and disadvantages. Sacrifice of the distal femoral or proximal tibial growth plate in a child four or more years from skeletal maturity presents distinct challenges. The choice that allows children to maintain the highest level of function is clearly the goal. Currently, the trend is moving more toward the use of expandable megaprotheses in the skeletally immature patient. However, leg-length discrepancy and durability of expandable endoprostheses may require reconsideration of reconstructive options in these younger children. Many of these children require multiple additional surgeries for: early mechanical failure, limb lengthening, infection, aseptic loosening, and other additional complications. We looked to explore long-term functional results and patient satisfaction of a rotationplasty cohort. We did this in a previous presentation. We now analyzed the estimated lifetime cost of rotationplasty versus expandable megaprosthesis placement.

QUESTIONS/PURPOSES:

The purpose of our study was to obtain and analyze long-term functional outcomes and the emotional and physical well-being of skeletally immature patients who underwent rotationplasty at our institution for the treatment of lower extremity sarcomas, which we did in a prior presentation. We now analyzed the cost of rotationplasty and expandable megaprosthesis. We hypothesize that rotationplasty is a cost-conscious option for patients and the health-care system and will be the less expensive option.

PATIENTS AND METHODS:

This institution performed twenty-four rotationplasties from 1991-2004. A survey was sent to the surviving members of the cohort. A survey queried the participants for emotional and physical impact of rotationplasty. We surveyed many markers including disease status (alive with disease, no evidence of disease and died with disease), length of follow-up, musculoskeletal tumor society scores (MSTS) and Toronto extremity salvage scores (TESS) to measure function and the 36-item short form health survey (SF-36) to measure quality of life after limb salvage. We have discussed this in detail previously. We later obtained the hospital bills of patients who underwent rotationplasty and expandable megaprosthesis placement. We compared these values and extrapolated the different surgical options out over a patient's expected lifetime.

RESULTS:

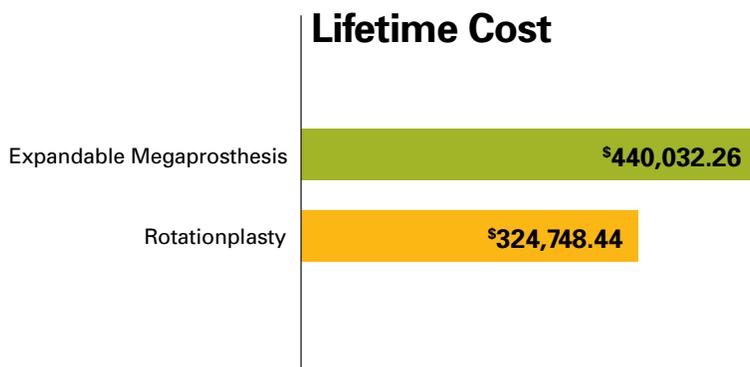
Of the twenty-four rotationplasty patients, at least seven died of disease. One is participating in this project and his survey was disqualified. An additional patient is currently incarcerated with no evidence of disease but was unable to participate. Seven patients were lost to follow-up. Results were based on the remaining eight respondents. The average age at time of rotationplasty was 11.6 years old. The average age at time of follow-up questionnaires is 30.0 years old. The average follow-up time is 18.4 years from rotationplasty surgery. The average MSTS score of the eight respondents was 68.33%. The average TESS score was 90.025%. The SF-36 results are given in reference to norm-based scoring with norm-based scores below 45 being below the average range for the general population. The norm-based scoring (N) averages of the eight patients were outlined previously with the summary of physical health (PC) 46.4, and summary of mental health (MC) 55.6. We found that the average lifetime cost of rotationplasty is \$324,748.44 and for expandable megaprosthesis placement is \$440,032.26.

CONCLUSIONS:

In our study, the patients who are alive with no evidence of disease are functioning well at an average of greater than eighteen-year follow-up. If the prosthesis fits right and the patient is initiated in it at a young age, patients function relatively well in comparison to their peers. Based upon the SF-36 average scores, our rotationplasty cohort functions in line with the general population on all levels. Rotationplasty is also the more cost-effective option overall. Based upon the current functional status of our cohort and the cost superiority, we believe that rotationplasty should still be a valid and possibly superior option in certain cases in limb salvage surgery.

If a child starts the treatment at age 9 and is followed up for 72 years, the table and graph (below) describe the two procedures and related costs. For rotationplasty, it takes the initial treatment (\$118,628.64) and 12 prostheses (17176.65 each). For expandable megaprosthesis, it takes the initial treatment (175,190.13), 4 lengthening (12601.92 each), and 5 knee prosthesis placement/revisions (42886.89 each). Without considering the time value (discounting over time), the total costs are \$324,748.44 for rotationplasty and \$440,032.26 for expandable megaprosthesis.

Year	Age	Rotationplasty	Expandable megaprosthesis
0	9	Rotationplasty procedure +prosthesis: 118628.64	Expandable megaprosthesis procedure: 175190.13
2	11		lengthening 1: 12601.92
4	13		lengthening 2: 12601.92
6	15	prosthesis 1: 17176.65	lengthening 3: 12601.92
8	17		lengthening 4: 12601.92
11	20		Total knee prosthesis placement: 42886.89
12	21	prosthesis 2: 17176.65	
18	27	prosthesis 3: 17176.65	
24	33	prosthesis 4: 17176.65	
26	35		Total knee prosthesis revision 1: 42886.89
30	39	prosthesis 5: 17176.65	
36	45	prosthesis 6: 17176.65	
41	50		Total knee prosthesis revision 2: 42886.89
42	51	prosthesis 7: 17176.65	
48	57	prosthesis 8: 17176.65	
54	63	prosthesis 9: 17176.65	
56	65		Total knee prosthesis revision 3: 42886.89
60	69	prosthesis 10: 17176.65	
66	75	prosthesis 11: 17176.65	
71	80		Total knee prosthesis revision 4: 42886.89
72	81	prosthesis 12: 17176.65	
Total costs without discounting		\$324,748.44	\$440,032.26



Left: Expandable megaprosthesis
Right: Rotationplasty

Early and Long Term Results of Reimplantation for a Prosthetic Hip and Knee Infection: An Analysis of the Host and Bacteria as Risk Factors

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INTRODUCTION:

Two-stage reimplantation has consistently yielded high rates of success for patients with chronic prosthetic joint infection. It is also well known that successful treatment may be influenced by host and microbial factors. Reinfection or failure may occur early after reimplantation of the prosthetic joint or after successful treatment and an extended disease free interval, but long-term results are uncommonly reported. The purpose of this study was to evaluate our experience with two-stage reimplantation at a minimum 5-year follow up. We also wanted to determine the effect of host factors and bacterial resistance on the success of an infection-free joint.

METHODS:

A retrospective review was performed of a consecutive series of patients from a single institution treated with a two-stage reimplantation for prosthetic hip and knee infection. Ninety-seven two-stage reimplantations (45 hips, 52 knees) were performed in 93 patients. The Cierny classification was used to help determine the host risk for a success reimplantation. Bacterial sensitivity or resistance was also used to determine its effect on successful reimplantation. Regression analysis and Fisher exact test were performed to interpret the data.

RESULTS:

The minimum follow-up for the evaluation of these patients was five years with an average of 13.3 years (range 5-20 years) from the time of reimplantation. Ninety-three patients (77%) had two or more risk factors and were classified as Cierny B Host. Malnutrition was also present in 53 of 93 patients (57%). Twelve patients (12 joints; 12%) developed an infection. Five joints (5%) failed reimplantation with the same organism identified at the time of resection arthroplasty or the first stage of a two-stage reimplantation. An additional seven patients (7%) developed a late infection with bacteria that was different from the bacteria identified at the time of the resection arthroplasty. Two additional patients (2%) required a revision for mechanical loosening. It is of interest that four out of five of the recurrent infections were in patients with methicillin resistant *Staphylococcus aureus* (3) or *epidermidis* (1). The failures that occurred early after reimplantation (< 1 year) were more often caused by a resistant organism, while failures that occurred later involved a different organism than was isolated in the original infection ($p=0.01$).

CONCLUSION:

The success of two-stage reimplantation was 95% same pathogen, 87% any pathogen, 83% any pathogen and mechanical failure. The majority of our patients were Cierny B hosts. Resistant bacteria were associated with early failure after reimplantation (<1 year) and sensitive bacteria were opportunistic causing an infection as late as 11 years after reimplantation. The frequency of late infections, as or more frequent than early infections, highlights the importance of educating our patients about their ongoing risk of prosthetic joint infection. It also provides a research opportunity to determine strategies for improving our patients' long-term success after reimplantation.

TABLE 1: CIERNY CLASSIFICATION

Host Immune Status

Type A:	Healthy host without healing deficiencies
Type B:	Host compromised by one or more local ^(L) &/or systemic ^(S) parameters
Type C:	Poor candidate for surgical intervention

Type B Host Factors Affecting Treatment and Prognosis

Local Compromises/B ^(L) Host	Systemic Compromises/B ^(S) Host
<ul style="list-style-type: none"> ■ Chronic lymphedema ■ Venous stasis ■ Major vessel disease ■ Arteritis ■ Extensive scarring ■ Radiation fibrosis ■ Retained foreign bodies (suture, buckshot) 	<ul style="list-style-type: none"> ■ Malnutrition ■ Immune deficiencies ■ Chronic hypoxia ■ Malignancies ■ Diabetes mellitus ■ Extremes of age (+70 years) ■ Chronic tobacco abuse (+40 packs/year) ■ Current tobacco abuse ■ Major organ failure

TABLE 2: TRENDS IN EARLY AND LATE REIMPLANT FAILURE

Patient Name	Ciery Classification	Initial Infection	Tissue Culture @ Reimplantation	Pathogen Identified @ Failure	Time from Stage Two to Failure
Early Failures					
HB	B	MRSA	Negative	MRSA	1 month
DK-S	B	MRSE	MRSE	MRSE	7 months
MH	B	MRSE	Negative	MRSE	1 year
DS	B	MRSE	Negative	MRSE	1 year
MA	B	<i>Streptococcus pneumoniae</i>	Negative	<i>Streptococcus pneumoniae</i>	1 year
Late Failures					
LM	B	Gp C <i>Streptococcus</i>	Negative	β hemolytic Gp G <i>Streptococcus</i>	3 years 7 months
JM	B	<i>Enterococcus</i> <i>Enterobacter</i> <i>Escherichia coli</i>	Negative	β hemolytic Group B <i>Streptococcus</i>	4 years 6 months
HM	B	Negative	Negative	Gp A <i>Streptococcus</i>	4 years 10 months
PN	B	<i>Pseudomonas aeruginosa</i>	Negative	Gp G <i>Streptococcus</i>	6 years
JR	B	<i>Staphylococcus epidermidis</i>	Negative	<i>Staphylococcus aureus</i>	7 years 3 months
JJ	A	<i>Staphylococcus aureus</i>	Negative	<i>Actinomyces israelii</i> , <i>Staphylococcus wamari</i> , <i>Streptococcus viridans</i>	9 years
CG	B	MSSA <i>Serratia marcescens</i>	Negative	MSSA	11 years

THE ARTIST

LAURIE VICTOR KAY

When work on the Lauritzen Outpatient Center and Fritch Surgery Center officially began in November 2014, Kevin Garvin, M.D., professor and chair, reached out to photographer and artist Laurie Victor Kay about creating several pieces of artwork for each floor of the four-story building. Kay took on the challenge of creating eight original installations for the nearly 170,000-square-foot building, a project that spanned nearly two years from concept to completion.



Kay and her husband, Charles, own Laurie and Charles Photographs in Omaha, and their commissioned portraits hang in collections throughout the world. For this project, however, Kay took a unique approach. She has always had a passion for science, and many of her final pieces were inspired by the typical imaging orthopaedic and other specialty surgeons see every day, including x-rays, MRI scans, histology slides and c-arm images. In the process of digitally blending medicine, science and art, Kay created pieces that, while beautiful at face value, often require a closer look to fully understand.

We are pleased to be able to preview a selection of these pieces of artwork on the cover, and in the pages of this report. These pieces represent the different specialty areas of our orthopaedic service, and pay homage to the mobility, health and quality of life our world-class surgeons strive to give their patients.

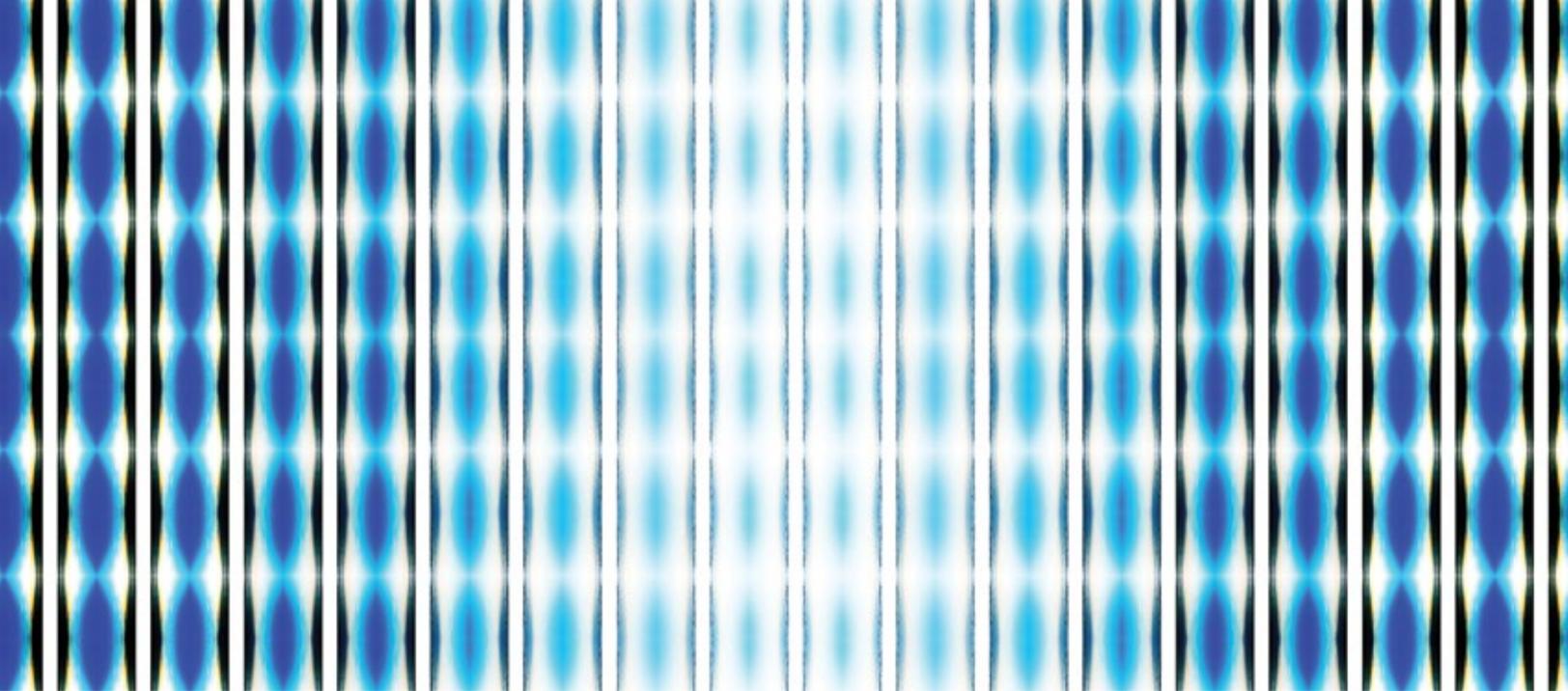
Q&A WITH LAURIE VICTOR KAY:

What first intrigued you about this project?

LVK: From the beginning, there was an openness to the creative process from Dr. Garvin. I cannot emphasize enough how important this was to me artistically. It allowed me to approach the project in a very pure way and this eventually reflected itself as the works progressed.

What challenges did you encounter while trying to mix science, medicine and art?

LVK: The challenges that presented themselves during the project were varied. Because I am an artist and not a physician, reading the many types of files that I had access to was at times an enigma. With each type of imagery, whether MRI, c-arm, or histology, I became drawn to various visual elements. Not knowing exactly what I was looking at was challenging at times, but I truly enjoyed the process of learning more about the practice of orthopaedic medicine. The research in the beginning – spending time in the McGoogan Library of Medicine’s rare book section, studying historical books and reading other publications – helped me bridge the gap. Another interesting challenge existed with differences expressed in the vast array of imagery. The organic versus inorganic structures were contrasting in ways that I wanted to express. My work is not formulaic – many different iterations were necessary during my production. Ultimately, the mixture of science, medicine and art became very seamless for me, so much so that I had a hard time stopping the creative process. There is so much beauty that exists within the science of medicine. I see possibility that is limitless.



What is your overall vision for this collection of artwork?

LVK: My vision for this collection is to create works that are multi-layered and speak to each other from floor to floor, work to work. As an artist, I am continually thinking about how a work will be read. Conceptually, I often work with contrasts and layers while presenting it visually in a way that is abstract or less obvious. Cellular images read as bodies of water or cloud-filled blue skies. Fractured bones are hidden by a kaleidoscopic pattern of jewel-like tones floating in white. What appears as modernist black and white circles reveals itself as c-arm slides of surgically-placed pins. On one floor, I conceptually reversed this and turned images of sea and sky into abstract forms that reference DNA and cells. There are many layers and levels to how I envisioned the collection for this building. The architecture beautifully frames the spaces and invites light, so I wanted the works to complement this architecture. My work tends to be very architectural so this part came a bit more easily. I thought about how works would be approached whether by patients or physicians. I also wanted to create works that were beautiful to look at and that inspired people.

How do you want people to feel when they view these pieces?

LVK: This is a question I often thought about during this project. I want the works to be uplifting and hopeful, and also to be cerebral in a way that they can be looked at and thought about on different levels. I've always believed that great artwork should not need an explanation, but that the story or concept behind the work should strengthen/reinforce what you see and make you ponder. It is enough for me to hear someone say, "I like that, but I don't know why." That said, my intention is for the work to ask the viewer to come back and look longer, closer, more deeply. My works don't take themselves too seriously in that there is a celebratory fun to what I am doing. The contrasts I work with allow many things to happen at once. I hope viewers will see this. The science of medicine is limitless, and with this work I am celebrating that. I'm also referencing the movement of medicine in both space and time. There is a meditative aspect to healing which is revealed abstractly in the works.

What motivated you to introduce color into many of these black-and-white original images?

LVK: The introduction of color was something that I knew would weave its way into the works for this project. The question to me became how to use color in a way that worked with the imagery and process. There are infinite reasons that I love color – especially its ability to make one feel something is profound. The selective use of color allowed me to create palettes within some of the works that gave an almost ephemeral feeling. In some cases, I used color to alter the original state of the image, as I did with the histology work. In others, the colors referenced water and sky, bringing the outside into the space. The contrast of images with color to the black and white imagery also provided the spaces with very differing landscapes of their own.



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