Dear Colleagues,

I am pleased to share with you the exciting accomplishments of the Methodist Bone & Joint Center over the past year.

In 2012, we improved efficiency, modernized anesthetic protocols and reduced surgical times in our state-of-the-art orthopaedic operating rooms, resulting in less pain, earlier ambulation, shorter hospital stays and a faster recovery for our patients.

Through our partnerships with the sports and performing arts communities, we are leading advances in the understanding of repetitive use injuries on the musculoskeletal system and are developing treatment protocols that will have applications for the broader medical community. Our physicians are furthering improvements in the use of platelet-rich plasma procedures and injection therapies with the goal of returning athletes to peak levels of performance.

We are proud of our accomplishments in joint replacement and reconstructive therapy, and our research that is revolutionizing surgical techniques and implant designs. Working collaboratively with bioengineers and medical device manufacturers, our surgeons are improving function of new, anatomically refined joint replacements for more natural movement and longevity, improving quality of life for patients.

Our translational research in nanotechnology and tissue engineering will have significant implications for the treatment of spinal disorders and other musculoskeletal conditions. Our physicians travel globally to present research findings and share ideas with colleagues from around the world.

Our reputation as a teaching hospital, providing not only instruction to tomorrow’s orthopaedic leaders but also research and innovation, changing protocol and improving outcomes, guides our drive toward continued excellence. This year, we launched an orthopaedic surgery residency program, the first new program in the United States in nearly 20 years.

The Methodist Bone & Joint Center is proud to share its accomplishments – made possible by the diligent work of our physicians, nurses, administrators and staff – in an effort to continue leading medicine.

Warm Regards,

Kevin E. Varner, M.D.
Interim Chairman
Department of Orthopaedic Surgery
Methodist Bone & Joint Center
Our dedicated, high-efficiency surgical suites have significantly increased the hospital’s capacity to perform orthopaedic surgery, enabling individual surgeons to perform between 300–500 cases annually.

*2012 annualized data*
The Methodist Bone & Joint Center is one of the largest, most active and comprehensive orthopaedic programs in the country. Our volume is amongst the highest in the nation for a single hospital.

Recognized for Orthopaedic Excellence
Ranked in 2012 as 21st in the nation by U.S. News & World Report, the Methodist Bone & Joint Center umbrellas an expansive network of clinical programs directed by renowned board-certified and fellowship-trained orthopaedic specialists. Currently, over 60 orthopaedic surgeons have privileges at Methodist.

Delivering Expert Patient Care
Our multidisciplinary team of orthopaedic surgeons, primary care sports medicine physicians, rehabilitation therapists and athletic trainers collaborate to deliver the highest quality care to patients with musculoskeletal diseases and disorders.

Fostering Orthopaedic Innovation
At Methodist, we understand that research today translates into health care solutions for patients tomorrow. Through collaborations with researchers locally and across the country, our physicians are making significant contributions to advances in orthopaedic medicine.

Preparing Orthopaedic Leaders
Through our primary academic affiliation with Weill Cornell Medical College and NewYork-Presbyterian Hospital, the Methodist Bone & Joint Center provides fully accredited residency and fellowship programs, designed to prepare the next generation of orthopaedic specialists through hands-on training and extensive research programs.

Methodist Bone & Joint Center
World-class expertise, innovative clinical research, state-of-the-art facilities and an unsurpassed commitment to our patients – these are just a few of the reasons the Methodist Bone & Joint Center has become a center of orthopaedic excellence to which patients, educational institutions, governing bodies and the medical research community turn for leading orthopaedic treatments and innovations.
“As a national leader in orthopaedic care, our center serves as a primary referral source for patients in need of revisions of failed joint replacements and other complex reconstructive treatments. We’re utilizing cutting-edge technologies and improved postoperative pain management techniques to improve the quality of life for patients following joint replacement.”

Stephen J. Incavo, M.D.
Section Chief, Adult Reconstructive Surgery
Professor Clinical Orthopaedic Surgery,
Weill Cornell Medical College
Program Director, Adult Hip & Knee Reconstructive Surgery Fellowship
Surgeons at the Methodist Bone & Joint Center provide the latest advances in reconstructive options and procedures, including anterior approach hip surgery, hip resurfacing, partial knee replacement, uni-compartmental knee arthroplasty, computerized surgical planning and navigation, and osteotomies to realign the knee. Led by Stephen Incavo, M.D., section chief of adult reconstructive surgery, the Methodist Bone & Joint Center is an internationally renowned leader in artificial joint replacement and serves as a primary referral source for patients in need of revisions of failed joint replacements and other complex reconstructive procedures.

**Comprehensive Approach to Complex Procedures**

The reconstructive surgeons at the Methodist Bone & Joint Center are proficient in the latest advances in joint replacement. In addition to traditional hip and knee surgeries, our physicians are using a new ankle replacement prosthesis, which was recently FDA approved in the United States. This mobile-bearing joint better simulates normal ankle rotation and significantly improves movement following ankle replacement surgery. Our hand and upper extremity specialists are performing advanced total wrist arthroplasty procedures yielding much better results than wrist arthrodesis. Their expertise is contributing to improved implants and internal fixation for fractures of the hand, wrist and elbow.

“There was never a question in my mind about where to go for treatment when my hips began deteriorating,” says professional dance instructor Mary Lee Kennedy. “I wanted to go to a physician who understood the needs of athletes.”

At 64, slowing down is not part of Mary Lee Kennedy’s plan. She fell in love with dancing at age 4, and it has been her life’s passion ever since, culminating in the successful formation of Kennedy Dance Theatre in Webster, Texas. Ultimately, it was this passion that took its toll on Kennedy’s hips, and in 2006, chronic pain began to set in. When simple activities like eating out and grocery shopping became difficult, she knew it was time to consider hip replacement.

Since then, Kennedy has had both hips replaced by Dr. Incavo at the Methodist Bone & Joint Center. Both procedures were successful, and she is back to teaching dance. “It’s like I have a new lease on life now.”

– Mary Lee Kennedy
Whether a patient’s case is straightforward or complex, each individual benefits from a comprehensive approach to patient care. This includes providing resources pre- and post-surgery, individualized surgical techniques and rehabilitation focused on returning a patient to normal activities quickly and safely.

**Collaboration and Innovation to Improve Patient Outcomes**

Surgeons at the Methodist Bone & Joint Center have been instrumental in the development and utilization of more than 25 hip and knee replacement procedures, three generations of hip replacement devices and more than 20 hip implant projects. Through our continued focus on research and development, our physicians are making significant improvements in joint replacement surgical techniques, implant materials and implant designs, with the goal of developing a longer-lasting, higher-performing implant.

In collaboration with the Institute of Orthopaedic Research and Education (IORE), Ken Mathis, M.D., and Philip Noble, Ph.D., have developed a sophisticated outcome evaluation tool for hip and knee replacement patients. The tool produces data which helps guide surgeons toward customized implants and surgical techniques that enable the best possible treatment outcomes, including ease of function, reduced pain and implant longevity. Now, the focus is not just about whether a knee replacement patient is pain-free, but whether the patient is able to resume normal activities. In addition, researchers continue to study methods for optimal anatomical matching of hip and knee replacement implant systems.

Our research is contributing to the development of less invasive surgical techniques, with the goal of reducing blood loss, ligament disruption and trauma to the soft tissues. Over the past few years, we have been developing anterior and posterior cruciate ligament sparing knee prostheses, and the kinematics of the current prototypes look promising.

Other research projects focus on better total knee arthroplasty (TKA) procedures, resulting in improved overall function and patient satisfaction. A study of mid-flexion laxity in TKA examines the two different alignment techniques commonly used, anatomic or mechanical, based on the bone axes selected for implantation of the prosthetic components. This study closely examines the axes of both during simulated physiologic knee joint motion using a simulator, as well as the relationship between these axes and the implication of medial-lateral soft tissue balance in TKA. Another current study focuses on the rotational positioning of the implanted components, specifically the role of tibial rotation compared to the more commonly studied rotational positioning of the femoral component. This study places the largest tibial component on the proximal tibia and examines the outcome of rotation — hypothesizing that maximizing tibial coverage will result in internal rotation of the tibial component, while also assessing the differences due to tray type (symmetric verses asymmetric) using four different commercially available tibial trays.

**TOTAL JOINT REPLACEMENTS**

<table>
<thead>
<tr>
<th>Joint Replacement</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1,727</strong></td>
<td>in 2012 (annualized)</td>
</tr>
</tbody>
</table>

**HIP REPLACEMENTS**

<table>
<thead>
<tr>
<th>Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary total hip replacements (including total, partial and resurfacing)</td>
<td><strong>602</strong></td>
</tr>
<tr>
<td>Hip revisions</td>
<td><strong>165</strong></td>
</tr>
</tbody>
</table>

**KNEE REPLACEMENTS**

<table>
<thead>
<tr>
<th>Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary total hip replacements, bilateral and unilateral</td>
<td><strong>756</strong></td>
</tr>
<tr>
<td>Revision total knee replacements</td>
<td><strong>163</strong></td>
</tr>
</tbody>
</table>

**INFECTION RATE**

<table>
<thead>
<tr>
<th>Rate</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1%</td>
<td>Our research on infections in knee replacements translates into an infection rate of less than one percent at the center.</td>
</tr>
</tbody>
</table>
In 2012, we furthered our advancements in kinematics with kneeling and squatting simulators. Utilizing cadavers, the simulators replicate the kinematics for intact knees, thus enabling researchers to more accurately assess the impact of new designs, with the goal of achieving native kinematics. This research has led to the development of several designs that are currently being used in reconstructive surgeries. Our surgeons are continuing to work on future design prototypes to improve the function and longevity of joint replacements.
Foot & Ankle

Targeted Treatments for Better Outcomes

The Methodist Bone & Joint Center is home to board-certified, fellowship-trained orthopaedic surgeons dedicated exclusively to the foot and ankle. Led by Kevin E. Varner, M.D., interim chairman of the Department of Orthopaedic Surgery, our specialists manage a wide range of foot and ankle injuries and conditions – from adult acquired flat foot deformity, foot drop, hammertoes and bunions, to foot and ankle trauma and congenital and genetic conditions.

Published authors who are also part of the official health care team treating professional and collegiate athletes as well as performing artists of the Houston Ballet, our foot and ankle specialists apply a comprehensive approach to every case. Treatment includes not only addressing pain or malformation, but also determining the source of the pain and peripheral impact for successful, sustained results.

This approach translates to some of the highest patient success rates in the nation for such procedures as achilles tendonitis and adult acquired flat foot reconstruction.

Our foot and ankle specialists collaborate with vascular and plastic surgeons on lower-limb salvage options for patients with lower extremity trauma.

In addition, the specialists are using a recently FDA-approved ankle replacement prosthesis, which is a mobile rather than static-bearing joint. The plastic component of the ankle replacement sits on a polished metal plate to simulate the normal rotational movement of the ankle for better movement following ankle replacement surgery.

Taking the Right Steps in the Care of Professional Athletes and Performers

Many of the treatment protocols developed for professional athletes with which our physicians work also apply to performing artists. According to a recent study, the injury rate for a professional ballet dancer was comparable to that of a professional football player – the Nutcracker Ballet is as demanding on performers as the Super Bowl on players.

The center’s foot and ankle specialists understand the repeated demand these professions place on the foot and ankle – and that treatment must withstand a return to these same activities. Dedicated to the ongoing study, treatment and prevention of injuries in ballet dancers, once a month Dr. Varner hosts a clinic at the new 115,000-square-foot Houston Ballet Center for Dance, where professional dancers and children in its dance academy receive personal care from physicians, trainers and physical therapists – a health care and educational initiative.

Extending Reach through Research

In order to improve treatment results for these inspiring professionals, which also translates into improved treatment for everyday active patients of all ages, the Methodist specialists are studying ballet injuries and treatment and recovery following arthroscopic surgical procedures. This research examines the type and number of injuries incurred by dancers during the past decade, as well as the duration of time they were unable to perform. The research team seeks information on injury patterns and prevalence of certain problems.

CPAM

A NEW BRANCH OF ORTHOPAEDIC RESEARCH, THE CENTER FOR PERFORMING ARTS MEDICINE

100 PATIENT CENTRIC PHYSICIANS
DEDICATED TO CARING FOR PERFORMING ARTISTS FROM AROUND THE WORLD.

Working collaboratively with the Center for the Performing Arts at Weill Cornell Medical College in New York and NewYork-Presbyterian Hospital, the Methodist CPAM program is uniquely designed to improve health care for performing artists around the world.

Read more at: methodistperformingarts.com

Patient centric Physicians

Physicians
within dancers of the Houston Ballet in order to better educate young dancers and improve treatment protocols that can be broadly adopted.

Our foot and ankle specialists also collaborate with colleagues in research efforts to improve the outcome of reconstructive and joint replacement procedures. Technology developed within the orthopaedic research lab is aiding the specialists in better understanding the mechanics of the foot and ankle and the impact of a patient’s specific movement. This information will enable physicians to address problems earlier as well as slow the progression of some degenerative conditions.

Working to improve treatment for adult acquired flat foot, specialists have also developed a device which simulates normal walking – in an attempt to recreate a collapsed foot arch. High-tech cameras detect sensors on a cadaver model, projecting images that provide detailed feedback about the breakdown occurring in foot abnormality. Once a flat foot is successfully recreated, a subsequent study will examine two different osteotomy techniques to determine the best approach to this problem.

“We attempt nonoperative, conservative measures first. But when that fails, there is no better place for the patient or physician to be than at Methodist. The technology, research and surgical advances result in some of the highest patient satisfaction scores and are what truly set us apart.”

Kevin E. Varner, M.D.
Interim Chairman, Department of Orthopaedic Surgery
The Methodist Bone & Joint Center is home to a superior level of hand and upper extremity expertise. Led by renowned hand specialist Evan D. Collins, M.D., chief of the Methodist Hand & Upper Extremity Center and board member for the Center for Performing Arts Medicine (CPAM), the center’s collaborative, patient-centric approach is translating into advancements in evidence-based treatment protocols.

Specialists offer the latest in minimally invasive endoscopic carpal and cubital tunnel releases as well as platelet-rich plasma procedures, percutaneous needle fasciotomy (PNF) and non-operative injection and rehabilitation therapies. Surgical advances in fracture repair and wrist arthroplasty have also improved outcomes for some of our more complex hand and upper extremity cases.

Uncovering New Advancements
Research remains a priority within the center, and our physicians serve as lead investigators in studies assessing new advancements in treating common tendinopathies. Our published works are contributing to improved reconstruction procedures and the management of scaphoid wrist fractures. Our efforts have improved the understanding of the role of the sigmoid notch in distal radius fractures and the reliability and reproducibility of MRI technology in evaluating the anterior oblique ligament and trapeziometacarpal joint – establishing effective imaging protocols for early identification of conditions leading to degenerative arthritis.

Performing Artists, the Unconventional Athlete
Leveraging our unique understanding of treatment protocols for returning athletes to peak performance, we have furthered studies in a new area of hand and upper extremity care – the “athletes” of the performing arts. Dr. Collins leads a dedicated,
with a Singular Goal

Research-driven team of physicians – from plastics, neurosurgery, neurology, ophthalmology and orthopaedics – who collaborate with nutritionists and specialized hand and rehabilitation therapists to care for this unique group. The team applies a pragmatic, holistic approach to the care of performing artists – assessing not only the mechanical and biological implications of the repetitive stress and overuse conditions from which they suffer over their long careers, but also the role of “capacity” in overstress conditions of the lifelong performing artist.

In collaboration with CPAM, Dr. Collins and Richard Stasney, M.D., FACS, founder of CPAM and director of the Texas Voice Center, are working to develop through capacity research and clinical outcome data effective protocols in the care of overuse, repetitive stress conditions and repetitive trauma – including persistent pain, loss of facility, endurance and strength as well as myofascial pain and tendinitis.

Research with the Best Translational Effect

Over 50 percent of musicians in the United States experience musculoskeletal injuries, with a recurrence rate of playing-related musculoskeletal disorders (PRMD) of over 35 percent. Research efforts are ongoing to determine the long-term impact of repetitive musculoskeletal stress in performing artists with the goal to provide evidence-based results in establishing preventive conditioning programs and uniform changes in treatment protocols for young artists at the start of their careers.

More closely aligned with everyday individuals than elite athletes studied through sports medicine, findings from the study of performing artists, whose career can last decades, will have far-reaching implications for everyday patients and will lead to better treatments and prevention of tendinopathic and other repetitive stress conditions for the general population. All clinical outcomes contribute to a global database translated for broader application and education.

“Our work with professional athletes and performing artists is translating into a better understanding of their unique health care needs, which will have significant implications for the care of everyday individuals experiencing repetitive stress conditions.”

Evan D. Collins, M.D.
Chief, Methodist Hand & Upper Extremity Center
Director, Plastic Surgery Resident Rotation
Individualized Approach to Neck and Spine Care

“...We're guiding tomorrow’s medical professionals through our fellowship and residency programs. They are participating in the exciting research we’re doing in nanotechnology and tissue engineering, as well as gaining experience from hands-on surgical training with subspecialty rotations mentored by physicians in the clinic, on the hospital floor and in operating rooms.”

Bradley K. Weiner, M.D.
Chief, Spinal Surgery
Medical Director, Orthopaedic Spine/Nanotechnology
Director, Orthopaedic Residency Program

The prospect of spinal surgery can be daunting for the strongest among us. Patients from around the world turn to the Methodist Bone & Joint Center for world-renowned expertise in spine care and microsurgical techniques. Microsurgery has ushered in a new era of techniques in which patient success is maximized and hospital stays are reduced. An international leader in the field, Bradley Weiner, M.D., has special expertise in managing lumbar and cervical degenerative conditions such as spinal canal stenosis and disc herniations.

Patients with more complex spinal conditions are regularly seen at Methodist. Darrel Hanson, M.D., has earned a strong international reputation for treating individuals with congenital deformities; his training included work at the top U.S. center for spinal abnormalities. Rex Marco, M.D., manages the care of patients with spinal tumors and patients who require large reconstructive procedures and, sometimes, orthopaedic oncology. Essentially, patients receive care from recognized leaders in each of their sub-specialties – an option for a small percentage of patients worldwide.

Setting the Standards for Tomorrow’s Spine Specialists

The section of spinal surgery continues to lead in preparing the next generation of orthopaedic surgeons. Orthopaedic surgery residents from Methodist’s own program as well as those from Baylor College of Medicine and the University of Texas Health Science Center receive specialized training here. Thanks to the quality of the program, these physicians are well prepared to care for patients in general orthopaedic practice or obtain top-flight fellowships if they aim to become subspecialists.
The Methodist Bone & Joint Center continues to advance spinal research and its application to patients worldwide. Bradley Weiner, M.D., and Ennio Tasciotti, Ph.D., lead Methodist’s Surgical Advanced Technology Laboratory, coordinating a team that applies the latest biotechnologies to treat spine and musculoskeletal care. The lab (formerly the Spine Advanced Technology Laboratory) has emerged as a national leader, garnering considerable grant funding and sharing its advances in medical publications and at national medical conferences. In this way, the advances benefit patients seen at centers all over the world.

RESEARCH HIGHLIGHTS

- Nanotechnologies for drug delivery, including antibiotics, anti-inflammatories, chemotherapeutic agents, analgesics and growth factors
- Nanotechnologies for proteomics, including nanochannel chips for detection of biomarkers of musculoskeletal disease
- Novel polymer development for resorbable fracture fixation and tissue engineering applications
- Novel methods for the procurement of stem cells, including mesenchymal stem cells
- Novel scaffold development for tissue engineering and drug delivery
- Tissue engineering, including platforms to make bone, cartilage, muscle and fascia
- Injectable tissue engineering
- Oncology, including 3D bioengineered tumors to study primary bone lesions and metastatic disease to bone
- Subprograms in ethics, evidence-based medicine and patient safety
Methodist Concussion Center

The Methodist Concussion Center (MCC) has become a national leader in sports concussion clinical care, community outreach and translational research. The center’s multispecialty team includes neurologists, neuropsychologists, neurosurgeons, primary care sports medicine physicians, orthopaedic surgeons and athletic trainers who provide comprehensive services to student, amateur and professional athletes as well as athletic trainers, school and youth sport coaches and parents throughout the region.

2,000+ concussed patients treated by MCC physicians in 2012.

8,000+ students tested using state-of-the-art computer program.

4x concussion rate

Studies suggest that the rate of concussions amongst student athletes has more than quadrupled over the past 10 years.

2,000+ concussed patients treated by MCC physicians in 2012.

More than 8,000 students have been tested for concussion using the state-of-the-art ImPACT® (Immediate Post-concussion Assessment and Cognitive Testing) computer program. Administered to objectively measure patient visual and verbal memory results, ImPACT® testing is used to determine post-concussion care and return-to-play decisions.
From a linebacker with the Houston Texans to a weekend warrior, athletes look to the Methodist Center for Sports Medicine (MCSM) for comprehensive treatment of sports-related injuries.

The collaborative, multi-disciplinary team of orthopaedic surgeons, primary care sports medicine physicians, rehabilitation therapists and certified athletic trainers provide the best in sports medicine and rehabilitative care.

Our comprehensive approach includes surgical and non-surgical treatment options, from arthroscopic treatment of knee, shoulder and elbow disorders to tendon reconstruction to customized rehabilitation plans. Through our primary care sports medicine team, the center is able to address non-musculoskeletal medical issues that impede sports performance, including concussion, asthma and cardiac abnormalities.

From the right-fielder to the prima ballerina, the soccer forward to the space walker, Methodist is the hospital where many Houston organizations turn for elite sports medicine. The center’s physicians serve as team consultants for many of the region’s professional sports teams, including the Houston Texans, Houston Astros, Houston Dynamo and Houston Rodeo, and professional arts organizations, such as the Houston Ballet and the Houston Grand Opera. In addition, physicians are actively involved as team physicians for collegiate, high school and club sports organizations throughout the region.
Sports Medicine continued

“Our orthopaedists and sports medicine specialists are fortunate to be able to provide care to athletes in Houston’s professional sports teams and serve the region’s universities, secondary schools and even amateur leagues as sideline physicians and consultants. And every day, we work with casual athletes and individuals at every level to help them return to peak performance.”

David M. Lintner, M.D.
Chief, Sports Medicine
Program Director, Orthopaedic Surgery Sports Medicine Fellowship

Enhancing Patient Performance through Specialized Sports Rehabilitation
The Methodist Center for Sports Medicine provides a full continuum of care for athletes, from initial diagnosis to rehabilitation and recovery, with the goal of enabling our patients to return to their maximum level of play quickly and safely. Accredited by the American Physical Therapy Association, our certified sports therapists collaborate with physicians to develop a treatment plan to rehabilitate patients following surgery and to provide nonsurgical management of sports injuries and conditions. With nine locations throughout the region, our state-of-the-art facilities feature the latest therapies and rehabilitation equipment, including the HydroWorx® 1200 pool, the AlterG® anti-gravity treadmill and a dedicated pitching lane.

Going the Extra Mile
Methodist’s commitment to patient care and improving the health of Houston-area athletes guides our community outreach. Through leveraging our large network of physicians, athletic trainers and physical therapists, the Methodist Center for Sports Medicine provides sports medicine resources within community schools and neighborhoods, including certified athletic training, sports injury clinics for on-site and weekend injury evaluation, physical therapy and injury-prevention seminars. Annual sports clinics provide thousands of young athletes with comprehensive health assessments in preparation for their participation in school sports programs. Additionally, high school athletes have access to a 24-hour hotline where they receive fast-track access to Methodist sports medicine experts.
Leading Sports Medicine Research for the Next Generation of Athletes

The Methodist Center for Sports Medicine remains focused on furthering innovations in the care of professional and amateur athletes to address the short-term and long-term impacts of overuse conditions and repetitive stress trauma placed on the musculoskeletal system.

Promising new studies include biomechanical research focused on the use of platelet-rich plasma procedures to promote improved soft tissue and ligament healing.

Building on our expertise in the treatment and rehabilitation of baseball-related injuries, the center is currently evaluating the outcomes of surgical and nonsurgical treatment options for shoulder injuries in baseball players, in addition to studies into the mechanics and strengths of various procedures to reconstruct elbow ligaments.

The center is pursuing further research into cartilage repair and regeneration. In 2012, Methodist is one of only 10 sites nationwide for engineered tissue placement in patients with cartilage damage.

Through collaboration with NASA Astronaut Corps, Patrick McCulloch, M.D., is leading research to better understand the orthopaedic and musculoskeletal needs unique to astronauts. The research examines the musculoskeletal demands on astronauts caused by weightlessness of space and confinement of spacesuits, which often results in osteoporosis and chronic back and shoulder pain. Our physicians are working to design an improved spacesuit that would enhance function and reduce the risk of injury. Research continues on the use of ultrasound technology for the diagnosis of musculoskeletal injuries and other conditions which occur during long space flights.
Preparing the Next Generation

For more than 50 years, Methodist has served as a teaching hospital for orthopaedic surgery residents. Today, our physicians remain committed to educating the next generation of orthopaedic leaders, with many serving as professors for The Methodist Hospital, Baylor College of Medicine and Weill Cornell Medical College.

In 2012, the Methodist Bone & Joint Center established its own academic orthopaedic surgery residency program, which is accredited by the Accreditation Council for Graduate Medical Education (ACGME). This residency program is the first new program established in the United States in nearly 20 years. Under Bradley Weiner, M.D., who serves as Program Director, the residency has a unique structure founded upon evidence-based care, surgical mentorship and academics.

Our residency program accommodates three residents per year for a total of 15 residents. The Methodist teaching faculty incorporates attending physicians in all sub-specialties, including joint reconstruction, spine, sports medicine, hand and upper extremity, foot and ankle, trauma, pediatrics, oncology and general orthopaedics. All attending physicians are fellowship-trained and their average duration of resident teaching experience exceeds eight years. All rotations are carried out at The Methodist Hospital with the exception of pediatrics (The Shriners Hospital) and trauma (Memorial Hermann Hospital), both of which are within walking distance of Methodist.
Didactic teaching consists of Wednesday Academic Days and takes place from 3 p.m. to 6 p.m. each Wednesday, under the leadership of an attending surgeon and the program director. During these academic sessions, residents comprehensively examine a particular problem from multiple angles. The first hour of work takes place at the Methodist Institute for Technology Innovation and Education (MITIE), considered by many as the top surgical simulation center in the world. Here, cadavers are used to teach anatomy and surgical approaches, and cadaveric specimens and sawbones are utilized in the teaching of surgical techniques. The second and third hours include a review of specific cases followed by a review of the case-specific literature with a focus on evidence-based quality. Residents spend an hour every Thursday morning discussing history, ethics and other topics. Every two months on Friday, the program hosts a visiting professor.

Methodist residents experience hands-on surgical training with subspecialty rotations, mentorship style. Residents work exclusively with one or two attendings on the service—in clinic, on the floors, in the ORs, and in personalized didactic and case sessions. Residents also take pre- and post-rotation written exams and have access to bound and online books dedicated to each subspecialty. This immersion-style of subspecialty training provides the best possible educational setting for our residents.

Our residents are actively engaged in research from their first year of residency, and are required to dedicate four months of time to orthopaedic research carried out in the Surgical Advanced Technology Laboratory (SATL) with a focus on nanotechnology and tissue engineering.

**Additional Programs**

- An ACGME-accredited orthopaedic sports medicine fellowship, a comprehensive sports medicine program offers extensive exposure to athletes at all levels, from “weekend warriors” to student athletes at the high school and college level to professional players. Our orthopaedic sports medicine fellows interact with patients, participate in the research labs and gain hands-on surgical experience.

- A post-professional clinical residency in Sports Medicine and Sports Rehabilitation, which prepares licensed physical therapists for their sports specialty exam. These residents work extensively with the orthopaedic sports medicine physicians and expansive network of sports-certified athletic trainers.

- A one-year fellowship in Adult Reconstructive Surgery, designed to provide clinical and research experience in total knee and hip replacement, with an emphasis on muscle-sparing reconstructive surgical approaches. Research is a highlight of the fellowship program and the Methodist research facilities are at the disposal of each fellow to facilitate investigations performed in direct collaboration with teaching faculty and the dedicated staff of engineers, clinical research specialists and computer scientists.

View our department staff’s Weill Cornell Medical College faculty assignments online at: methodisthealth.com/orthopedics
Envisioned by Barbara Lee Bass, M.D., chair of The Methodist Hospital Department of Surgery, the Methodist Institute for Technology, Innovation & Education (MITIE) allows us to provide our fellows with animate training sessions, learning space and robotic training. Facilities of this caliber are not available anywhere else in this part of the world.

To accomplish these missions, MITIE contains essential elements housed under one roof:

**Virtual hospital:** The virtual hospital uses simulation technology to recreate any part of the patient care environment. Skills ranging from establishing an airway on a partial task simulator to crew resource management of an operating room emergency on a high-fidelity full patient mannequin can be practiced here.

**Procedural skills lab:** The procedural skills lab is equipped to conduct hands-on procedural training using animate and inanimate models. Each skills station is essentially a compact operating room with all the tools necessary to conduct procedures across a variety of surgical and medical specialties.

**Research operating rooms:** Equipped with surgical robots and image-guidance technology, the core suite of research operating rooms in MITIE is focused on training in robotic surgery, image-guided procedures and the development of new technology. Robotic training is available for fellows.

For more information about MITIE, visit: methodisthealth.com/MITIE
State-of-the-Art Research Centers
A Nucleus of Innovation

The Methodist Bone & Joint Center is widely considered a leader in translational research. Working in collaboration with the Methodist Institute for Technology, Innovation and Education (MITIE), two facilities provide a platform for continued innovation and advancement in orthopaedic care: the Institute for Orthopaedic Research and Education (IORE) and the Surgical Advanced Technology Laboratory (SATL).

Institute for Orthopaedic Research and Education (IORE)
Led by Philip Noble, Ph.D., IORE brings together the best orthopaedic specialists and researchers in the region to advance orthopaedic care through achieving a greater understanding of musculoskeletal conditions and treatments. IORE’s goal is to develop new innovations in orthopaedic treatment, explore applications for new technologies and enhance the results of surgical procedures, while impacting surgical outcomes through the design, assessment, and evaluation of new devices and therapies. Current studies are focused on advancements in joint replacement design and performance, new solutions for sports and dance injuries, methods of enhancing the function and satisfaction of patients following hip and knee surgery, and novel therapies to prevent hip arthritis.

Surgical Advanced Technology Laboratory (SATL)
Formerly known as the Spine Advanced Technology Laboratory, the SATL has expanded beyond its original focus on musculoskeletal medicine to a greater mission of discovering novel technologies and unique applications that will benefit surgical patients. Under the leadership of Bradley Weiner, M.D., and Ennio Tasciotti, Ph.D., the lab consists of 10 researchers with diverse experience and expertise.

Over the last four years, grant funding for the lab has exceeded $10 million. A grant from the Department of Defense for $7.9 million was extended this year by $825,000. In addition to other foundation funding, the lab recently applied for a $25 million AFIRM grant.
Through their work in state-of-the-art laboratories and collaborations with academic research centers worldwide, the physicians and researchers at the Methodist Bone & Joint Center are leading advances and innovations in orthopaedic medicine. They remain committed to furthering research that will lead to less invasive treatment protocols, surgical efficiency and improved implant designs, with the goal of enhancing patient outcomes and quality of life. The following list of publications represents a sample of the center’s research endeavors.


**Collins ED.** Magnetic resonance imaging technology in evaluating the presence and integrity of the anterior oblique ligament of the thumb. Orthopaedic Reviews. 2012 June;14:44:13.


The Methodist Hospital in Houston, Texas, has earned an international reputation for excellence in patient-centered care. Located in the renowned Texas Medical Center®, Methodist is one of the largest private, nonprofit, academic medical centers in the United States. From its humble beginnings as a 19-bed community hospital in 1919 to the global destination it is today, Methodist has offered patients cutting-edge medical treatments and techniques, sophisticated diagnostic technology and groundbreaking research.

**Academics**

In 2004, The Methodist Hospital formed a partnership with Weill Cornell Medical College and NewYork-Presbyterian Hospital. This primary affiliation enables the three internationally renowned institutions to collaborate to ensure a rapid exchange of ideas, providing high-quality patient care, cutting-edge clinical and biomedical research, and the most innovative medical education and training of future physicians and biomedical scientists. These three institutions share the highest commitment to providing the best care for patients — as well as the best training for young physicians through residency programs for graduate medical education.

Methodist also has affiliations with Baylor College of Medicine, University of Houston, Texas A&M University and The University of Texas Medical Branch.

**Milestones and Awards**

Methodist is consistently recognized nationally for patient outcomes and medical proficiency. The Methodist Hospital ranked among the country’s top hospitals in 13 specialties in U.S. News & World Report’s 2012 “Best Hospitals” issue, more than any other hospital in Texas. For eight consecutive years, FORTUNE® magazine has named Methodist one of the “100 Best Companies To Work For®.” The Methodist Hospital System is the only health care organization in Texas to be recognized.

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At Methodist, we recognize that today’s best will not be good enough for tomorrow. Our physicians, researchers and staff are pressing ahead toward a greater and grander vision, one that helps shape the future of medicine. As a world-class academic medical center, Methodist brings together the best of patient care, research, and education and is consistently recognized as a top-ranked health care provider – year after year, Methodist is Leading Medicine.