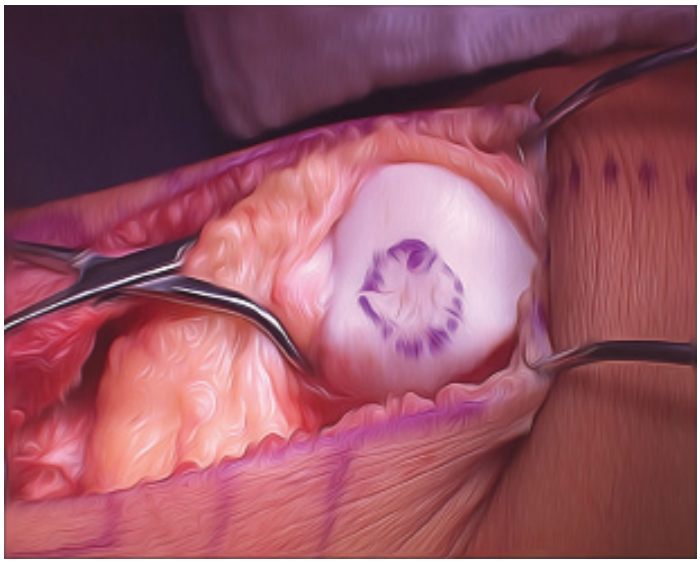
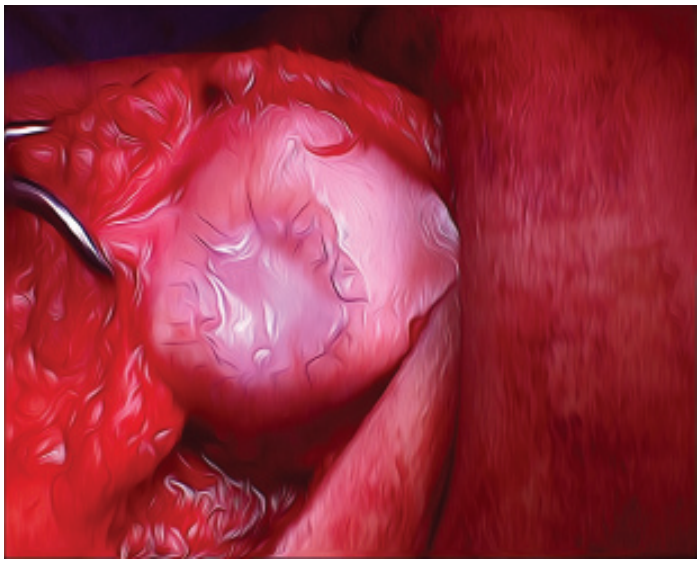
University Hospitals Case Medical Center
Cleveland | Ohio

SCHOOL OF MEDICINE
CASE WESTERN RESERVE UNIVERSITY

Winter 2014

INNOVATIONS
in Orthopaedics





The Leading Edge of Joint Preservation
pg 4

BEST CHILDREN'S HOSPITALS U.S.News & World Report ORTHOPEDICS 2013-14

BEST GRAD SCHOOLS U.S.News & World Report MEDICAL RESEARCH 2014

University Hospitals Case Medical Center and Case Western Reserve University School of Medicine are consistently recognized as two of the premier institutions in the nation, according to U.S. News & World Report's annual rankings.

Chairman's Message

The Joint Preservation & Cartilage Restoration Center Takes Center Stage

This issue of Innovations in Orthopaedics features our Joint Preservation & Cartilage Restoration Center. Our collaborative team of specialists offers the most advanced techniques available to repair joint and cartilage damage.

Led by **Michael J. Salata, MD**, Director, Joint Preservation & Cartilage Restoration Center, and Assistant Professor, Orthopaedics, Case Western Reserve University School of Medicine, these talented surgeons, supported by leading-edge researchers, are on a mission to save native joints and preserve joint function. A former assistant team physician for the Chicago White Sox and Chicago Bulls, Dr. Salata brings a strong background in sports medicine to the center.

Hip arthroscopy is a rapidly growing surgical technique that is now offering solutions for hip pain, a condition that has been difficult to diagnose and treat. Dr. Salata is a pioneer in the field of hip arthroscopy. Thanks to his leadership and expertise, we have one of the few centers in the country doing a high volume of complex hip arthroscopy.

We are proud to highlight **Patrick J. Getty, MD**, Director, Musculoskeletal Oncology, UH Seidman Cancer Center. Dr. Getty is also Director, Orthopaedic Surgery Residency Program, Case Western Reserve University School of Medicine. As a nationally recognized specialist in orthopaedic oncology and reconstruction, Dr. Getty treats musculoskeletal tumors with advanced techniques, including limb-sparing surgery and endoprosthetic reconstruction.

Included in our Research Corner is seminal work from the University Hospitals Case Medical Center/ Case Western Reserve University Center for Evaluation of Implant Performance by **Drs. Matthew J. Kraay** and **Clare Rimnac** on the causes of implant erosion.

In Department News, we recognize honors bestowed on past and present members of our department family. Two past chairs of our department have been honored for lifetime achievement. Dr. Kraay, our current Director of Joint Reconstruction and Arthritis Surgery, has been elected to both the Hip Society and the Knee Society, a rare and prestigious achievement. In addition, two of our former residents were recently appointed to chair outstanding academic orthopaedic departments.

I hope you enjoy reading about these developments in the following pages. We always welcome your comments, questions and suggestions. Feel free to contact us via email, phone or our professional referral service.

Randall E. Marcus

Randall E. Marcus, MD
Charles H. Herndon Professor and Chairman
Department of Orthopaedic Surgery
University Hospitals Case Medical Center
Case Western Reserve University School of Medicine

Innovations in Orthopaedics Winter 2014, Volume 6, Issue 1
Contributors: Randall E. Marcus, MD; Patrick J. Getty, MD; Donald Goodfellow, MD; Michael J. Salata, MD; Roger Wilber, MD; Matthew J. Kraay, MD
Publication Coordinator: Rich Riley

University Hospitals Case Medical Center
Cleveland | Ohio

SCHOOL OF MEDICINE
CASE WESTERN RESERVE UNIVERSITY

The commitment to exceptional patient care begins with revolutionary discovery. University Hospitals Case Medical Center is the primary affiliate of Case Western Reserve University School of Medicine, a national leader in medical research and education and consistently ranked among the top research medical schools in the country by U.S. News & World Report. Through their faculty appointments at Case Western Reserve University School of Medicine, physicians at UH Case Medical Center are advancing medical care through innovative research and discovery that bring the latest treatment options to patients.

Recognizing Past, Present and Future Achievements

"This winter I would like to recognize some of the prestigious honors recently given to present and former members of our program," says **Randall E. Marcus, MD**, Charles H. Herndon Professor and Chairman, Department of Orthopaedic Surgery, University Hospitals Case Medical Center and Case Western Reserve University School of Medicine.

Dr. Matthew J. Kraay

Two Prestigious Elections

"**Dr. Matthew J. Kraay** has been recognized for his outstanding work in the field of orthopaedic joint replacement surgery through his election to both the Hip Society and the Knee Society, two of the most prestigious specialty societies in our profession," says Dr. Marcus. Both organizations comprise internationally recognized experts and leaders in the fields of hip and knee replacement surgery. Only one other active orthopaedic surgeon in Northeast Ohio has been elected to either one of these organizations.

Dr. Kraay is Director, Division of Joint Reconstruction and Arthritis Surgery, UH Case Medical Center; and the Kingsbury G. Heiple and Fred A. Lennon Professor of Orthopaedics, Case Western Reserve University School of Medicine.

Recognition for Lifetime Achievement

"Recognition for lifetime service goes to two former chairs of the Case Western Reserve University and UH Case Medical Center Department of Orthopaedics," says Dr. Marcus. **Victor M. Goldberg, MD, and Kingsbury G. Heiple, MD**, have both been honored by the Arthritis Foundation for a legacy of outstanding orthopaedic care. The honor recognizes the significant roles these men have played in improving the lives of people with arthritis. According to the Arthritis Foundation, Drs. Goldberg and Heiple have been instrumental in mentoring other physicians who have gone on to careers across the nation and around the globe.

Dr. Heiple is Professor Emeritus of Orthopaedics, Case Western Reserve University School of Medicine. Dr. Heiple was the seventh chair of the department and was followed by Dr. Goldberg. Both of these distinguished chairs, as well as its current chair, Dr. Marcus, were mentored and trained by Charles H. Herndon, MD. Dr. Herndon, who became chairman in 1953, is credited with leading the department into the modern era of national recognition.

A Legacy of Excellence Carried Into the Future

Finally, Dr. Marcus congratulates two former residents from the Case Western Reserve University School of Medicine's Orthopaedic Residency Program who will carry the legacy of the orthopaedic teaching program well into the future. "I am proud to recognize two of our alumni," says Dr. Marcus. "Michael Archdeacon, MD, graduated from our program in 2000 and has been appointed Chair of the Department of Orthopaedic Surgery at the University of Cincinnati College of Medicine. Andrew Pollak, MD, residency class of 1993, has been appointed Chairman of the Department of Orthopaedics at the University of Maryland Medical Center.

"The UH Case Medical Center Department of Orthopaedics honors its legacy of more than 100 years of orthopaedic excellence," says Dr. Marcus. "The department can be proud of the past, present and future contributions of its distinguished members who have delivered on University Hospitals' mission: To Heal. To Teach. To Discover."

The Arthritis Foundation Great Lakes Region, Northeastern Ohio recently honored Victor M. Goldberg, MD (standing, fifth from left) and Kingsbury G. Heiple, MD (seated) for their contributions to and legacy of orthopaedic care, education, innovation and improving the lives of people afflicted with arthritis. We salute our colleagues for this well-deserved recognition and honor.

The Leading Edge of Joint Preservation

The Joint Preservation & Cartilage Restoration Center at UH Case Medical Center

The objective of the Joint Preservation & Cartilage Restoration Center at University Hospitals Case Medical Center is to save native joints, improve joint function and reduce pain. To accomplish those goals, you need to save cartilage.

"Cartilage is the key to joint preservation because it has a poor blood supply. That means it is not good at repairing itself," says **Michael J. Salata, MD**, Director of the Joint Preservation & Cartilage Restoration Center and Assistant Professor of Orthopaedics at Case Western Reserve University School of Medicine. "A cartilage defect exists in isolation. Our job is to use the latest advances to repair the damage and save the joint."

The orthopaedic team tasked with saving joints at UH Case Medical Center works collaboratively to evaluate each joint problem and devise a treatment plan to restore optimal function based on each patient's lifestyle and goals. This may include open surgery, arthroscopic surgery, osteotomy and advanced techniques such as autologous chondrocyte implantation, DeNovo® NT Natural Tissue Graft, and even using a patient's own blood supply to heal certain injuries.

Team Members Have Special Skills

Even the most advanced technology is only as good as the clinicians who use it. The joint preservation team at UH Case Medical Center is one of the most experienced and talented group of surgeons you will find anywhere and is supported by a team of devoted researchers. That means patients who visit the center have early access to leading-edge alternative treatments and innovations.

Dr. Salata has a strong background in sports medicine with a special interest in knee joint restoration. Before coming to UH Case Medical Center, he was assistant team physician for the Chicago White Sox and the Chicago Bulls. "The knee is like a wheel. The bone is the rim and the cartilage is the tire. We fix holes in the tire to save the wheel," says Dr. Salata. "Our three key goals are ligament stability, proper alignment and meniscal integrity."

Dr. Salata also offers the latest advances in hip arthroscopy. Patients who once suffered for months or years from difficult-to-diagnose and difficult-to-treat hip pain conditions are now being offered hip arthroscopy procedures that may prevent the development of osteoarthritis and hip replacement surgery. One example is arthroscopic treatment of femoroacetabular impingement (FAI).

Roger Wilber, MD, Assistant Professor of Orthopaedics at the School of Medicine, is skilled at open surgical repair of the hip and knee joints. This could include hip dislocation to repair a torn labrum or osteotomy to restore hip alignment. "These procedures can be offered to patients who have failed previous surgery," says Dr. Wilber.

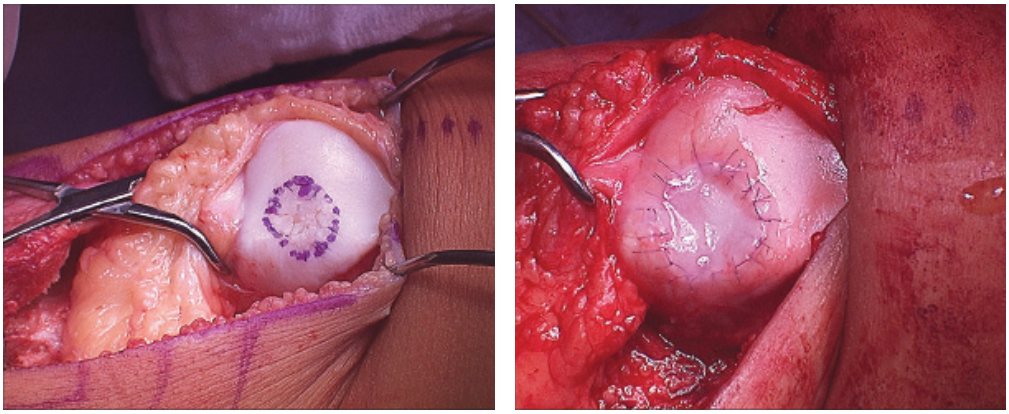
To align and correct knee deformity, one newer procedure being offered is a proximal tibial medial opening wedge resection. "The goal of all our procedures is to preserve native joint function and prevent total knee and hip replacement," explains Dr. Wilber.

Other members of the team include **Brian Victoroff, MD**, Associate Professor of Orthopaedics at the School of Medicine and Director of shoulder surgery, who has a special interest in adolescent sports medicine, rotator cuff surgery and shoulder surgery. **Shana Miskovsky, MD**, Assistant Professor of Orthopaedics at the School of Medicine, has expertise in sports medicine, foot and ankle reconstruction, foot and ankle surgery and minimally invasive ankle arthroscopy. **Donald Goodfellow, MD**, Associate Professor at the School of Medicine and Director of Sports Medicine at UH Case Medical Center, focuses on adult sports medicine and arthroscopic surgery.

Transplants, Implants and Stem Cells

"Transplants and implants are reparative techniques we can use to relieve pressure on joints for as long as possible. They can include DeNovo NT Natural Tissue Grafts, autologous chondrocyte implantation, and microfracture to stimulate the release of stem cells from bone marrow," says Dr. Goodfellow.

A DeNovo NT juvenile cartilage transplant uses cartilage harvested from a young donor. "This is cartilage that is 13 years



Pre- and postoperative images for a patellar ACI surgery

Drs. Michael J. Salata, Donald Goodfellow, Brian Victoroff and Roger Wilber

old or less. These transplants have the advantage of being a one-step procedure. They may be a better choice than an autologous chondrocyte implantation in an older patient because, as we age, our cartilage loses more of its ability to regenerate," says Dr. Goodfellow.

In an advanced autologous chondrocyte implantation, a patient's own cartilage is removed, grown in the lab, and then reimplanted. "This is a two-step procedure, but it may be the best option for younger patients," says Dr. Goodfellow.

Microfracture surgery may be performed as a minimally invasive arthroscopic procedure to stimulate cartilage to repair itself. It can be especially useful in younger patients with minor cartilage damage. Blood and stem cells released from areas of the microfractures form a clot around damaged areas of cartilage, which stimulates new growth.

Surgeons and clinical researchers at the Joint Preservation & Cartilage Restoration Center are contributing to advancements in the field by developing new treatments and diagnostic tools for joint and cartilage repair and giving patients access to the latest innovations and leading-edge technology, before they're available elsewhere. "We offer a full gamut of cartilage restoration options and individual treatments based on each patient's needs," says Dr. Salata. At the Joint Preservation & Cartilage Restoration Center, state-of-the-art is the standard of care.

More Advances on the Way

On the horizon is the collagen meniscus implant. This is an implant made of a biologically derived material, which is designed to guide new tissue growth using the body's own healing process. "This transplant will serve as a matrix to be populated by the body's own cells. You will be able to grow a new meniscus," says Dr. Goodfellow. "We may be able to offer this procedure within the next two to five years."

Learn More

To make an appointment, learn more or refer a patient to the experts at the Joint Preservation & Cartilage Restoration Center at UH Case Medical Center, call **216-844-7200**.

Orthopaedic Oncology

A specialist in a highly focused, little-known specialty

Patrick J. Getty, MD, is a specialist's specialist when it comes to orthopaedic cancer.

"I am a specialist in a very small specialty. Lots of doctors don't even know my specialty exists," says Dr. Getty. In addition to being Director, Musculoskeletal Oncology, Dr. Getty is Director, Orthopaedic Surgery Residency Program, Case Western Reserve University School of Medicine.

Dr. Getty did his residency and fellowship training at The University of Chicago and came to University Hospitals Case Medical Center in 1999. "There were very few orthopaedic departments with a position for a specialist in oncology and musculoskeletal tumors," recalls Dr. Getty. Although he is the only orthopaedic tumor person in the system, he gets plenty of support from his partners and from the other oncology specialists. "The experience here has been fantastic. We have a team of multidisciplinary specialists who work together to provide the most advanced technology available," says Dr. Getty.

Patrick J. Getty, MD

As a specialist in orthopaedic oncology and reconstruction, Dr. Getty works closely with his colleagues at the Joint Preservation & Cartilage Restoration Center. "We are using more advanced technologies to push the envelope for bone resection with preservation of native joints," says Dr. Getty.

Dr. Getty holds the UH Case Medical Center Barbara Peterson Ruhlman Chair in Orthopaedics and is Associate Professor, Orthopaedics, Case Western Reserve University School of Medicine. Additionally, Dr. Getty was Chief of Orthopaedics at the Louis Stokes Cleveland VA Medical Center for six years.

As a specialist in orthopaedic oncology and reconstruction, Dr. Getty works closely with his colleagues at the Joint Preservation & Cartilage Restoration Center. "We are using more advanced technologies to push the envelope for bone resection with preservation of native joints," says Dr. Getty.

Treatment methods for musculoskeletal tumors may include preoperative embolization, minimally invasive biopsy, limb-sparing surgery with endoprosthetic reconstruction, radiofrequency ablation, CyberKnife® radiosurgery and intraoperative radiation therapy. Dr. Getty's team specializes in the use of metallic endoprosthesis to reconstruct bones and joints after removal of bone tumors. Many limb-sparing options are available to fit each patient's needs and lifestyle.

The mission of University Hospitals is: To Heal. To Teach. To Discover. Teaching is a big part of Dr. Getty's role. As Program Director, Orthopaedic Surgery Residency, Dr. Getty teaches students, residents and fellows. There are 32 residents in the program. "We have one of the top orthopaedic residency programs in the country. Greater than 90 percent of our residents go on to fellowships," says Dr. Getty.

Orthopaedic oncology is more than technology, and Dr. Getty wants doctors and patients to know that the orthopaedic oncology section at UH Seidman Cancer Center is also very sensitive to the emotional turmoil of a cancer diagnosis. "If a doctor or patient calls us with an abnormal lump or bump, we get them in the next clinic day," says Dr. Getty.

Dr. Getty may be a section of one, but he is part of a team that offers leading-edge techniques for surgery, chemotherapy, radiation and reconstruction in cases of musculoskeletal tumors. Major advances in these techniques have greatly improved treatment of these lesions. His training, experience and dedication to his craft are a big part of why UH Case Medical Center can offer the best possible outcomes to its patients.

Learn More

Conditions that are commonly treated at UH Case Medical Center include sarcomas of soft tissue and bone; benign lesions of bone and soft tissue tumors; osteoid osteomas; metastatic tumors to bone and soft tissue; and giant cell tumors of bone, bone cysts, and pigmented villonodular synovitis (PVNS). To refer a patient or learn more about orthopaedic oncology at UH Case Medical Center, call **216-844-7200** or visit **UHhospitals.org/Ortho**.

A Black Cloud on the Horizon?

UH researchers are probing the causes of corrosion in modular joint replacement implants

Metal-on-metal (MOM) hip replacements were reintroduced as a wear-resistant alternative bearing for total hip arthroplasty (THA) about 14 years ago. The potential for use of a large femoral head that could reduce the incidence of dislocation made them a popular option. As a result, the relative usage of large femoral head MOM THAs grew to approximately one-third of all THAs done in 2008. A variety of adverse reactions to metal debris (ARMD) have been reported to occur locally and systemically with MOM THAs, including hypersensitivity issues and tissue necrosis, as well as elevated blood levels of cobalt and chromium due to wear on the articular surfaces of these devices. Some of these reactions (e.g., pseudotumors) have been disastrous and the use of MOM THA has since declined dramatically.

Severe taper corrosion of femoral component

A Growing Concern

Contemporary total joint replacement (TJR) devices are modular in nature. Modularity in TJR devices was originally restricted to interchangeable femoral heads in THA and modular stems in total knee arthroplasty (TKA). In the 1990s, however, modular neck femoral stems were introduced to allow surgeons even greater intraoperative flexibility and ability to better restore patient biomechanics. Taper corrosion and metal release at the modular junction of femoral heads had been previously identified in retrievals during the 1980s to 1990s, but its clinical importance was unclear and the use of modularity in TJR increased. Recent THA designs, which incorporate metal-on-metal bearings, larger diameter femoral heads, adapter sleeves and modular necks, have recently reintroduced implant corrosion as a major clinical concern, due to the potentially catastrophic consequences of adverse reactions to metal debris seen with MOM THA. Similar observations of ARMD, secondary to taper corrosion, have recently been reported in total knee replacement, as well.

A Complex Problem

Investigators at the University Hospitals Case Medical Center/ Case Western Reserve University Center for Evaluation of Implant Performance are working closely with **Steven M. Kurtz, PhD**, Director of the Implant Research Center at Drexel University, to define the clinical significance and underlying causes of corrosion of modular total joint replacement devices. "There is consensus that the mechanism of taper corrosion and metal release from modular interfaces is best characterized as mechanically assisted crevice corrosion (MACC). MACC is a complex, multifactorial phenomenon involving design, patient and clinical factors," says **Clare M. Rimnac, PhD**, Associate Dean of Research, Case Western Reserve University Case School of Engineering; and Co-Director of the Center for Evaluation of Implant Performance.

"Despite decades of use with modular tapers, the design details for these interfaces are manufacturer-specific and have changed over time," adds Dr. Rimnac. "Even the basic CoCr alloy metallurgy used for these components has undergone significant changes through the years."

Worrisome Reports

Recently, rare cases of elevated metal ion levels, pseudotumors and other findings of ARMD have been reported in patients with metal-on-polyethylene THAs. The source of metal debris and elevated metal ion levels in these patients appears to be due to corrosion of the modular tapers on the femoral stem. "Although the incidence of clinically significant taper corrosion is unknown, these reports of ARMD in metal on cross-linked polyethylene (XLPE) THAs are worrisome since this is the bearing couple used in nearly all THAs today," says **Matthew J. Kraay, MS, MD**, Co-Director of the Center for Evaluation of Implant Performance. "The introduction of alternative bearings, including XLPE, resulted in a shift in the use of larger femoral head sizes with associated increased bending moments exerted on the modular tapers. This factor, in addition to changes in taper technology, may contribute to this problem."

"These reports of ARMD in metal on cross-linked polyethylene (XPLE) THAs are worrisome since this is the bearing couple used in nearly all THAs today."
—Matthew J. Kraay, MD

Finding a Solution

"Implant retrieval analysis is an integral tool for tracking the natural history of corrosion and fretting damage in contemporary modular metallic alloy components," says Dr. Rimnac. Since the UH Case Medical Center/Case Western Reserve University Center for Evaluation of Implant Performance is one of the lead sites of a multicenter implant retrieval consortium, Drs. Rimnac and Kraay are optimistic that a comprehensive scientific analysis of this problem will advance our understanding of corrosion of modular TJR devices.

University Hospitals of Cleveland
Marketing & Communications
MSC 9160
11100 Euclid Avenue
Cleveland, OH 44106

When to Refer for Hip Arthroscopy

Hip arthroscopy at University Hospitals Case Medical Center offers solutions for difficult-to-diagnose and difficult-to-treat hip pain conditions.

"Hip arthroscopy has been around for decades, but in the past few years there have been significant advances. We can now diagnose and treat many conditions that people once just had to cope with," says Michael J. Salata, MD, Director, Joint Preservation & Cartilage Restoration Center, and Assistant Professor, Orthopaedics, Case Western Reserve University School of Medicine.

Dr. Salata, a pioneer in the field of hip arthroscopy and sports medicine, brought his skills to UH Case Medical Center three years ago. "We are one of the few centers offering high-level, complex hip arthroscopy," says Dr. Salata. "We do a high volume of cases in patients between the ages of 18 and 50."

One of the most common cases Dr. Salata treats is femoroacetabular impingement (FAI). "FAI is a bony mismatch in the hip joint; this leads to an inability of the joint to absorb shock and eventually to arthritis," says Dr. Salata. "We can reshape the bone during arthroscopy, relieve pain and, hopefully, delay or prevent hip replacement surgery."

Candidates for referral are patients with pain localized to the hip with minimal evidence of osteoarthritis. "Patients with persistent hip pain and normal imaging may benefit from referral. These patients are difficult to diagnose, resulting in delays of up to 21 months. Being evaluated by a top hip specialist can save a lot of time and discomfort," says Dr. Salata.

In addition to FAI, common conditions treatable with hip arthroscopy include:

- Mild hip dysplasia with labral tears
- Acetabular labral tears
- Removal of loose bodies
- Gluteus medius tears
- Chronic trochanteric bursitis
- Coxa saltans (snapping hip)
- Iliopsoas tendonitis

Grand Rounds Schedule

Jan. 8, 2014
Orthotics and Prosthetics
Robert Leimkuehler, CPO
Leimkuehler Inc.

Jan. 22, 2014
Electrophysiology/Peripheral Nerves/ Neuromuscular Disease, Part II
Bashar Katirji, MD
Department of Neurology
UH Case Medical Center

Jan. 29, 2014
Soft Tissue Management in Traumatic Injuries
Brendan Patterson, MD
Department of Orthopaedics
MetroHealth Medical Center

Feb. 19, 2014
Compression Neurology of the Upper Extremity
J. Robert Anderson, MD
Department of Orthopaedics
UH Case Medical Center

Feb. 26, 2014
Rotator Cuff Disease and Management
Robert Gillespie, MD
Department of Orthopaedics
UH Case Medical Center

March 5, 2014
Evaluation and Treatment of Femoral Shaft Fractures
Ari Levine, MD
Department of Orthopaedics
MetroHealth Medical Center

March 26, 2014
Pediatric Cervical Spine Clearance
Allison Gilmore, MD
Department of Orthopaedics
UH Case Medical Center

April 9, 2014
To Be Announced
Theodore Ganley, MD
The Children's Hospital of Philadelphia

April 16, 2014
Evaluation and Treatment of Orthopaedic Injuries in Multiple Trauma
Heather Vallier, MD
Department of Orthopaedics
MetroHealth Medical Center

April 30, 2014
Concussion Management in Sports
Amanda Weiss Kelly, MD
Departments of Pediatrics and Orthopaedics
UH Case Medical Center

May 7, 2014
Statistics for Dummies and Orthopaedic Surgeons
Raymond Liu, MD
Department of Orthopaedics
UH Case Medical Center

May 21, 2014
Pediatric Lower Extremity Fractures
Jochen Son-Hing, MD
Department of Orthopaedics
UH Case Medical Center

July 30, 2014
Benign Tumors of Bone
Patrick J. Getty, MD
Department of Orthopaedics
UH Case Medical Center

For further information about these events held at Case Western Reserve University, the Iris S. and Bert L. Wolstein Research Building Auditorium, including directions, please contact Ellen Greenberger, Education Coordinator, at **216-844-3233** or **Ellen.Greenberger2@UHhospitals.org**. All Grand Rounds start at 7 a.m.

Orthopaedic Triage Service

Clinical Nurse Sandra Costello, RN, answers physicians' questions, triages patients and ensures that appointments are made within 48 hours when necessary. Call **216-844-7200** to access orthopaedic specialists and refer patients to UH Case Medical Center's Department of Orthopaedics.