

In Motion

UR Medicine Orthopaedics and Rehabilitation

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I am pleased to have this opportunity to share a number of very exciting developments in the Department of Orthopaedics and Rehabilitation.

First, we have expanded our faculty (see page 6) to include two more joint replacement surgeons, Thomas Myers, M.D. and Ben Ricciardi, M.D., and one non-operative arthritis specialist Nicole Strong, D.O., to respond to the growing demand for hip and knee replacements in our community. Sports surgeon Sandeep Mannava, M.D., Ph.D. and non-operative sports specialist Sarah Vengal, M.D. have joined us this summer, and spinal surgeon Emmanuel Menga, M.D. will start in early fall.

We have also expanded our offerings in foot and ankle care with the acquisition of Metro Footcare, bringing podiatrists with outstanding reputations under the departmental umbrella. You'll find more about the new UR Medicine Podiatry on page 8.

Our outstanding incoming class of trainees includes seven residents and five fellows. The Department has been awarded permission from the Accreditation Council for Graduate Medical Education (ACGME) to have a second fellow in sports medicine, expanding our ability to educate the next generation of sports surgeons. A larger base of trainees means it's time to look ahead to our future needs, so we are working with the senior leadership of

the medical center and the university to plan strategically for orthopaedic surgery in the next decade, including space needs.

We are very proud of the continued outstanding success in the Center for Musculoskeletal Research (CMSR), which we've highlighted throughout this newsletter. Our research has led to a tremendous response from grantmakers—in fact, we are ranked #2 on a national survey for National Institutes of Health funding. Our researchers have been published in high-impact publications, with cover stories in scientific journals including Nature.

I am particularly excited about the strides we are making in collecting and using the Patient-Reported Outcomes Measurement Information System (PROMIS), in which we have taken a national leadership role. We now have a database with more than five million data points that can be used in patient care and improvement. Through our research, we have been able to demonstrate that our data is just as good—and often better—than data collected for years on paper questionnaires. A new wave of science is showing that patient-reported outcomes collected preoperatively will help to determine which patients will benefit the most from elective surgery.

Everyone in the Department of Orthopaedics and Rehabilitation is extremely proud of our tradition of outstanding education, meticulous research and excellent patient care. Now we look forward to embracing the challenges of population management as UR Medicine reaches farther into our community and region.

A handwritten signature in black ink, appearing to read 'Paul Rubery'.

Paul T. Rubery, M.D.
Marjorie Strong Wehle Professor of Orthopaedics
Chairman, Department of Orthopaedics and Rehabilitation

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PROMIS and UR VOICE Expand to 30 Departments/Divisions

PROMIS, the 11-year, multimillion-dollar initiative by the National Institutes of Health, has been in use for more than two years throughout UR Medicine Orthopaedics. Thanks to the PROMIS assessment, orthopaedic surgeons at UR Medicine now have a way to understand the outcomes their patients expect and want from their surgery and treatment, and whether or not these outcomes are actually taking place.

Collecting information from patients about their condition on the day of their office visit has had a dramatic impact on UR Medicine's understanding of the effectiveness of treatments, noted Judith Baumhauer, M.D., M.P.H., Orthopaedic Surgeon and director of the URM PROMIS, who has chaired the project since the beginning.

The acronym stands for Patient Reported Outcomes and Measurement Information System, and UR Medicine Orthopaedics decided to make it part of daily care: "Every day, every patient, every visit," said Baumhauer. Today, patients take slightly more than two minutes when they arrive to answer questions about their level of health using an iPad mini loaded with a proprietary system called UR VOICE (University of Rochester Validated Outcomes in Clinical Experience). The information becomes instantly available to the doctor and viewed in the electronic record, so the doctor and patient can discuss the PROMIS scores and together make decisions about the next step in treatment. Today, more than 30 departments/divisions are using PROMIS.

In addition to the immediacy of information about the patient's condition, PROMIS plays a major role in data collection about the effectiveness of treatments. "For example, we can look at all of the

patients with ankle arthritis and see what's working," Baumhauer explained. "Some may have milder arthritis and others have more severe; some want to get back to playing basketball and others can't walk out to the mailbox. You can see how treatments work in different populations, and see which ones provide benefits and which do not. We can look at this data and see if injections increase physical function, what works for pain and who will have the most benefit from surgery." From a primary care standpoint, physicians can use the data to advise patients on the most effective treatments to pursue or if a referral to a specialist will be beneficial.

"In a world of constrained healthcare dollars, these comparisons are important because society must make difficult choices about how money is spent on treatment and procedures," said Paul Rubery, M.D., Chair of the UR Medicine Department of Orthopaedics. "PROMIS is going to inform that choice, allowing the patient to determine in a valid way how he or she is functioning and feeling. That's why we see PROMIS as extraordinarily important, certainly from the perspective of improving patient care, but also from the perspective of business planning and positioning the department for ongoing financial success."

Use of PROMIS and the UR VOICE patient interface will continue to spread throughout UR Medicine in the coming months. In addition, Baumhauer and her team presented the results of PROMIS at the International Society of Quality of Life Research (ISOQOL) conference in Copenhagen, Denmark, in October 2016, where it was the only clinical symposium selected for the meeting.

Surgery Videos Help Doctors and Patients

Real-time video capture has become part of daily practice for Brian D. Giordano, M.D., Associate Professor in Orthopaedics and Rehabilitation, who uses video to share information with colleagues and show patients the results of their procedures.

Giordano live-streamed a surgery to hundreds of colleagues attending an International Society of Arthroscopy conference in Cairo, Egypt, in 2016. Now he uses the technology to deliver benefits to his patients in Rochester as well. "Our practice has been designed from the ground up with the ability to integrate multiple service lines, including radiology and physical therapy, as well as general surgery and medicine," he said. "Using this technology, we can share video data and information with our radiologists, who can view live surgery on a screen in their own suite. In this way, medical professionals from multiple disciplines work together collaboratively to improve effectiveness and precision of patient care and mutually benefit from enhanced connectedness. Using these innovative technologies, I can demonstrate anatomy that may have been an area of concern for the radiologists or where interpretations were unclear, and we can review rehabilitation strategies with a physiotherapist based on the severity of damage and type of surgery performed."

Patients who see "before and after" video get a better understanding of the injury or hip deformity that was causing them pain and mobility problems, and see firsthand how Giordano corrected it in surgery. "A black-and-white picture of arthroscopy is not visually appealing and doesn't convey the high quality of surgical care to the patient," he said. "Information technology is expanding so rapidly, and we want to use it to enhance patients' experiences in our program."

Giordano can download OR video files to his iPad right after a case, and show them to the patient and family in post-op. He also sends files to patients electronically. "I can take live video of a patient's surgery and annotate it, do a voice-over on the video and e-mail it to the patient," he said. "It's a very positive experience for patients, and they often share the video with family and friends."

Baumhauer Publishes in NEJM on Patient-Reported Assessments

Judith Baumhauer, M.D., M.P.H., Professor and Associate Chair of Academic Affairs in the Department of Orthopaedics, wrote about how patient-reported outcome (PRO) assessments are reaching their potential by improving health care in the July 6 issue of the New England Journal of Medicine. Baumhauer examined how UPMC and medical centers around the world are working to involve the patient in decisions of care and cost by using technology's full potential, amid the challenges of incorporating computer-driven surveys in busy clinical environments.

"There is a growing chorus of support from clinicians, researchers and payers for embracing PRO measurement instruments in clinical care," Baumhauer wrote. "However, there are still important practical questions about how data on these outcomes should be collected, visualized, shared and used to improve the quality of care."

Baumhauer, as Medical Director of PROs and PROMIS, leads the Medical Center's implementation of patient-reported outcomes. "PROMIS provides a validated history of symptoms such as physical function, pain and even mood used here at UPMC amongst other hundreds of symptom options," Baumhauer says.

Baumhauer was invited to write the perspective because UPMC is one of the world leaders in making the technology work in a clinical setting and, more importantly, in translating this information into clinically meaningful decision making to benefit our patients.

UPMC Orthopaedics collected PROs from 80 percent of its patients at every outpatient clinic visit for the past two years, and expanded its survey system to 30 other departments and divisions over the past year. It has collected over one million PROMIS surveys, and the data are yielding results.

"We implemented assessments widely and made it highly visible to our patients and physicians," Baumhauer said. "Most importantly, we showed that this information has real clinical value—as a physician, it can change how you practice. For healthcare organizations, it can help you identify and deliver patient-centered care more cost-efficiently."

PRO data can help surgeons compare their outcomes and identify areas for improvement, eliminate procedures with less favorable outcomes and allow patients to view their anticipated "roadmap to recovery" using PROs. This helps set patients' expectations for their recovery.

"Data from the PROs give the clearest roadmap yet for physicians and patients who are weighing surgical options for their patients," Baumhauer said. "Now when a patient asks about surgery for their condition, I can tell them, 'Based on hundreds of patients who had the same condition, you're doing too well to benefit from surgery at this point. Let's discuss other options for you.' Patients love that. They don't want us to "practice" on them. Patients want to know surgery will benefit them if they are going to take time away from work, lose their income during that time, depend on family and friends during their recovery and assume the risks of surgery."

Baumhauer will be program chair of the 2017 PROMIS Health Organization (PHO) international meeting in Philadelphia in October.

"This is putting the patient front and center in health care," Baumhauer said. "Giving patients a voice in their treatment and letting them tell us what is working to make them function better, have less pain and/or emotionally improve is how we should be determining the best treatment strategies for all conditions."

Gut Microbiome Affects Musculoskeletal Health

Results from a URM Clinical and Translational Science Institute (CTSI) incubator project suggest there is a connection between gut microbes in obesity and impaired musculoskeletal health. Manipulating the gut microbiome in obese animals can slow osteoarthritis and speed healing after fracture.

Obesity and type 2 diabetes can delay healing and accelerate joint cartilage erosion in osteoarthritis. The 2015 Incubator project, led by Michael Zuscik, Ph.D., Associate Professor of Orthopaedics; Robert Mooney, Ph.D., Professor of Pathology; and Cheryl Ackert-Bicknell, Ph.D., Associate Professor of Orthopaedics, aimed to understand how and why this occurred.

The group found that all of the negative effects of obesity were linked to changes in the gut microbiome. Feeding mice a high fat diet to mimic obesity and type 2 diabetes altered the types of bacteria in their colon, favoring pro-inflammatory bugs. This coincided with greater systemic inflammation, which may have contributed to accelerated osteoarthritis and delayed fracture healing.

The team found that these negative effects may be reversible. In preliminary studies, obese mice were fed a fiber supplement that they cannot digest, but that certain helpful gut microbes love. Despite continuing to feed the mice a high fat diet, the non-digestible fiber shifted their microbiome back toward the non-inflammatory bacterial profile seen in lean mice. Essentially, the non-digestible fiber completely reversed the negative effects of obesity on the musculoskeletal system, making the obese mice indistinguishable from their lean counterparts in terms of musculoskeletal health.

“Osteoarthritis is a big problem, because we don’t have any established and accepted method to treat patients,” said Zuscik. “If we can address a disease modifying situation by altering the microbiome in the gut, that may be a straightforward way to address this big problem. For 25 years, clinical trials of all kinds of interesting approaches to protect joints have gone nowhere. It’s a complex disease, and the joint is a complex organ that has all kinds of tissue problems. Maybe understanding how the microbes within us may have implications, and altering them, could be a great way to protect these structures. It’s a new way of thinking about joint health.”

Musculoskeletal Researchers Engage Local Under-Represented Students in Science

Since January of 2017, a group of students and faculty in the Center for Musculoskeletal Research at the University of Rochester Medical Center have been mentoring under-represented or economically disadvantaged teens in Rochester. The program, called MedClub, holds monthly hands-on science lessons and provides guidance to middle and high school students in the Greater Rochester area who are interested in science or medicine.



Jacob Kallenbach, a Biomedical Engineering graduate student, explains the biomechanics of delivering medications in hydrogels to a group of MedClub students in the Champion Academy.

MedClub grew out of a partnership between the CMSR and the Champion Academy, an extreme mentoring and empowerment initiative led by Rochester City School District alumnus and Super Bowl champion Roland Williams. The Champion Academy is a year-round program that aims to instill its 300 student participants with character and “unbreakable belief” that they can achieve their dreams, whatever they might be.

For a handful of those students, like Nygel King, a 10th grader enrolled in Champion Academy, the dream is to become a doctor or scientist. “I joined MedClub to further my knowledge of medicine because of

my mom,” said Nygel. “She has diabetes and I almost lost her three times, so that made me want to know more about her disease.”

Once a month, about 30 students take a break from regular Champion Academy programming to join MedClub. These students get a chance to perform hands-on science experiments ranging from owl pellet dissections to learning how drugs can be delivered in hydrogels. The students also get some insider knowledge about medical and graduate school from MedClub mentors. In February, the students toured the CMSR and got a behind-the-scenes peek at life in a lab.

Other students, like Nygel, hope that MedClub can give them a foundation of knowledge to help them reach their goals. Eighth grader Shakira Jones hopes to someday become a geriatric nurse after caring for her grandmother who battled breast cancer. She believes joining programs like Med Club now will give her a leg up later.

Nygel and Shakira are among seven Champion Academy students who took part in URM’s Science and Technology Entry Program (STEP) this past summer. MedClub mentors encouraged the students to apply for the NYS-funded past summer science program for under-represented students and helped them with their applications.

Alayna Loiselle, Ph.D., Assistant Professor of Orthopaedics in the CMSR who spearheads MedClub, feels the program also benefits the mentors. Partnering with the Champion Academy offers CMSR graduate students the chance to directly interact with high-risk youth in our community, and learn to be mentors.

“This has been a fantastic opportunity for our graduate students to expand their mentoring and teaching skills,” said Loiselle. “Seeing the enthusiasm that the MedClub students have for science is a great reminder to the mentors of how fortunate we are to be able to conduct science as a career.”

Edward Schwarz, Ph.D., Burton Professor of Orthopaedics and CMSR Director added, “MedClub is a perfect symbiosis that is changing hearts and minds, while educating the next generation of medical professionals in Rochester. I’m very grateful to Roland Williams and the amazing staff at the Champion Academy for this remarkable partnership. We are thrilled to provide a portal for these kids and young professionals to continue their quest for scientific and medical knowledge, which will ultimately help them achieve their dreams.”

Cartiva Implant Proves Effective in Great Toe Arthritis, First in the Nation

In an award-winning, seven-year study, Judith Baumhauer, M.D., M.P.H., et. al, determined that the synthetic cartilage implant manufactured by Cartiva is effective in preserving range of motion in osteoarthritis of the great toe. This finding may make the Cartiva implant the new gold standard in treating great toe arthritis.

“Until now, the best treatment has been to fuse the toe, leaving a stiff, straight toe with the pain being markedly less,” said Baumhauer. “But a lot of times, patients want to retain their motion. Implants have been shown to cause some bone destruction and wear debris that make salvaging that toe much more difficult, and outcomes are less than if you had just gone to a fusion.”

The Cartiva implant has been used in other parts of the body, but this was the first study that examined its use in the great toe. “Here in Rochester, we did the first implant in the country,” said Baumhauer. “The study demonstrated that the Cartiva implant was as effective as fusion for pain, and it increased function. I anticipate that it will become a very common procedure.”

CMSR Researchers Discover Bone Infection Bacteria in Bone Micro-Channels

Researchers in URM’s Center for Musculoskeletal Research (CMSR) have defined where and how bacteria that cause life-threatening and incurable bone infections may hide in tiny channels within bone, eluding immune or antibiotic attack. This study is the first to demonstrate that the bacteria can change shape and “move” to colonize tiny channels in mouse bone.

Staphylococcus aureus is a common bacteria that can cause painful skin infections or life-threatening blood or bone infections. It can form bacterial communities deep within bone where it can survive for long periods of time, making these bone infections extremely difficult and costly to treat. Patients with *S. aureus* bone infections are often treated with antibiotics and undergo surgery to remove infected tissue, but infection recurs in 40 percent of patients and amputation of infected limbs is sometimes necessary.

“The challenge with bone infections is that they tend to be incurable,” said Edward Schwarz, Ph.D., Richard and Margaret Burton Distinguished Professor in Orthopaedics and Director of the CMSR. “Surgeons take extra margins around infected bone, reconstruct and the infection comes back. They don’t understand why this infection keeps coming back, and neither did we.”

Inclusion of under-represented individuals has been a mission of the CMSR since its inception in 2000. MedClub is funded through 2021 as part of the Enrichment Program in the CMSR’s NIH-funded Resource-Based Center for Musculoskeletal Biology and Medicine grant (P30 AR069655).

Cartiva approached Baumhauer directly to conduct the study, which involved patients and sites in the United Kingdom and Canada rather than in the United States to speed the process. The team then presented the evidence to the FDA, and the results were accepted, so the implant became available in the United States.

“We just published the five-year data from the Canadian sites,” said Baumhauer. “It’s a 90 percent win—in only one out of ten implants, they had continued pain.” In the ten percent of cases that did not respond well, the implant can be removed with no adverse reaction, and the surgeon can fuse the toe. “So when you remove the implant and you fuse it, you didn’t lose any ground in the pain relief and function.”

Baumhauer will present her team’s findings at the Japanese Orthopaedic Association conference, and at the International Foot and Ankle Society conference in Portugal this year.

Lead author Karen de Mesy Bentley, M.S., Director of the Electron Microscopy Shared Laboratory and faculty associate in the Department of Pathology and Laboratory Medicine at URM, used transmission electron microscopy (TEM) to examine infected mouse femurs and tibias. Bentley discovered the bacteria within the tiny channels, called canaliculi, during her many hours of TEM examination of the tissue. “Once the bacteria get in there, they can live several hundred years after the host is dead because the bone is an inexhaustible food supply,” Schwarz said. “They’ve evolved this mechanism because it’s nirvana in there—the immune system can’t get them and they can live forever.”

The team has preliminary evidence that *S. aureus* also colonizes canaliculi of human patients with *S. aureus* bone infections. “There are increasing numbers of patients suffering from *S. aureus* infected foot ulcers or periprosthetic joint infection,” said Irvin Oh, M.D., the lead researcher for this study. “Our novel finding elucidates the mechanism of *S. aureus* bone infection in humans. This finding gives us a new insight into the nature of this infection, and may lead us to find a more effective treatment against this resilient infection.”

Six Physicians Join Department of Orthopaedics

The Department of Orthopaedics and Rehabilitation recently welcomed joint replacement surgeons Thomas Myers, M.D. and Benjamin Ricciardi, M.D.; orthopaedic surgeon and sports medicine specialist Sandeep Mannava, M.D., Ph.D.; physical medicine and rehabilitation physician Nicole A. Strong, D.O.; orthopaedic spine surgeon Emmanuel N. Menga, M.D.; and sports medicine physician Sarah Vengal, M.D. The new doctors will meet the ongoing growing demands of the department, continue to provide patients with improved access to the UR Medicine Spine Center and the Evarts Joint Replacement program, and serve high school, college and professional athletes throughout the Greater Rochester area.



Dr. Myers has a master's degree in physical therapy, graduated from Temple University School of Medicine and completed his orthopaedic residency at the University of Pittsburgh, where he was chief resident. He also completed a fellowship in adult orthopaedic reconstruction research at the University of Virginia and a fellowship in adult reconstruction at The Cleveland Clinic. Dr. Myers comes to UR Medicine

after several years in private practice at Orthopaedics Northeast in Ft. Wayne, IN. He is a board certified orthopaedic surgeon specializing in primary and revision total joint replacement of the hip and knee, with a special interest in anterior hip replacement and in rapid-recovery strategies such as preoperative physical therapy, medication management and interdisciplinary care—approaches that optimize patients for surgery to obtain the best possible outcomes.



Dr. Ricciardi specializes in total knee replacements and total hip replacements. He recently completed a European fellowship in hip reconstruction with the ME Müller Foundation. Dr. Ricciardi also completed a residency in orthopaedic surgery and a fellowship in adult reconstruction and joint replacement at the Hospital for Special Surgery in New York City, where he served as a research

fellow in the mineralized tissue laboratory. A graduate of Weill Cornell Medical College, Dr. Ricciardi received his Bachelor of Arts degree from Colby College. The Hospital for Special Surgery, where he received his training, is the world's largest academic medical center dedicated to orthopaedics, rheumatology and related specialties.



Dr. Mannava is a graduate of the State University of New York at Syracuse medical school, and completed his orthopaedic surgery residency at Wake Forest University. During his residency, he graduated from the Wake Forest Graduate School of Arts and Sciences with a Ph.D., awarded for research related to rotator cuff disorders. Dr. Mannava went on to complete his arthroscopy and sports

medicine fellowship training at the Steadman Clinic and Steadman Philippon Research Institute in Vail, CO. While in Vail, he served as a physician for the United States Ski and Snowboard Association (USSA), providing international medical coverage at FIS World

Cup events. He remains an active volunteer physician with USSA, delivering medical care for U.S. Olympic athletes. Dr. Mannava also helped in the treatment of professional and elite athletes from the NFL, NHL, NBA, MLB and numerous Olympians while serving as a fellow in Vail.



Dr. Strong completed her residency in physical medicine and rehabilitation at the University of Rochester School of Medicine in 2017, where she served as chief resident and earned many honors, including the Grand Rounds of the Year Award for her paper on the use of stem cells in the treatment of discogenic back pain. She received her Bachelor of Arts degree in chemistry and kinesiology

from Hope College in Holland, MI, and her medical degree from Northwestern University.



Returning to his alma mater from the University of Texas Health Science Center in San Antonio, where he served as an orthopaedic spine surgeon, Dr. Menga graduated from the University of Rochester School of Medicine and completed his internship and residency at Johns Hopkins University. He served in the United States Navy in Norfolk, VA, while completing his Bachelor of Science degree

at Old Dominion University. Dr. Menga received fellowship training in orthopaedic spinal and deformity surgery at the New York University Langone Medical Center and Hospital for Joint Diseases. He has been published in many medical journals, and has contributed chapters to five books. Dr. Menga's poster and podium presentations have been featured at numerous professional conferences.



Dr. Vengal is a familiar face to sports teams throughout the area, as she previously served as team physician on the sidelines at St. John Fisher College, Penfield High School, Brockport College and SUNY Geneseo, as well as for the Rochester Knighthawks and Rochester Rattlers professional lacrosse teams. Dr. Vengal also provided her expertise to both the Rochester Marathon and as ringside and

pre-fight physician for professional boxing matches. She earned her Bachelor of Science degree at the University of Akron in OH, and her medical degree from Northeast Ohio Medical University. Dr. Vengal completed her residency in family medicine at the University of Rochester School of Medicine and Dentistry, and followed this with the University of Rochester sports medicine fellowship. Dr. Vengal is board certified in family medicine and has a Certificate of Added Qualification in sports medicine.

"We are delighted that these incredibly talented physicians and surgeons are joining our faculty," said Paul Rubery, M.D., Chair, Department of Orthopaedics and Rehabilitation. "UR Medicine continues to attract gifted surgeons and physicians who are committed to clinical excellence and innovation in health care."

Link Between Lead in Bone and Osteoporosis Revealed

When people ingest lead in their drinking water, eat lead-based paint chips or breathe in lead from nearby industrial sites, this metal takes up residence in their bones. Once it arrives in the bone, it inhibits the skeleton's ability to develop normally—and it can become a risk factor for osteoporosis.

How lead causes bone loss became the basis for research in the laboratory of J. Edward Puzas, Ph.D. and Danielle Benoit, Ph.D. Their lab used mouse models to determine the effects of lead as a cause of osteoporosis, and the ways that lead's destructive influence can be reversed.

When the blood's calcium level drops below the body's requirement for it, the body automatically takes calcium from its own bones by activating osteoclast cells that resorb this supply of calcium. The work of the osteoclasts leaves a resorption pit—a divot in the bone—as well as targeting enzymes, chemical signals that the bone requires repair. These targets attract osteoblasts, cells that go directly to the divot and fill it in with new bone. As long as this remarkable system is working, the body regulates its own calcium requirements and the bone remains healthy.

Introducing lead into this system, however, prevents the osteoclasts from leaving the signals that attract the osteoblasts to repair the bone. The divots become larger and more frequent, and the resulting porosity becomes osteoporosis. "This happens millions of times over decades of time, so the total mass of the skeleton decreases," said Puzas. "Osteoporosis is a misalignment between the bone taken away and the bone being replaced."

Puzas and his team discovered the targeting enzyme the osteoclast leaves for the osteoblast, and labeled it a tartrate resistance acid phosphatase (TRAP). "The osteoblast has a targeting instinct that

recognizes this TRAP and makes a beeline for it," he said. "We now know what the bait is. So is there a way that we can use this therapeutically? What if we synthesize this homing device and put it in the mouse?"

Danielle Benoit, Ph.D., Co-Lead Inventor at the Center for Musculoskeletal Research (CMSR) and the University of Rochester Stem Cell and Regenerative Medicine Institute, has spent more than a decade developing polymeric delivery systems like this one. She focused her research over the last six years on developing targeting systems for bone-specific delivery of therapeutics. She synthesized the TRAP and attached it to the targeting entity, making it controllable—so it can be placed exactly where the bone requires repair. The osteoblasts went directly to the TRAP and began to fill the resorption pits.

"The results we have seen from this research show signs of something really quite revolutionary," Benoit said.

Seeing the enormous potential for this, UR Ventures, the university's technology transfer department, has patented the therapeutic agent and entered into a partnership to commercialize it. In 2016, Taithera, Inc., a biotechnology company based in New York City, announced that it intends to take the next steps to make the therapy available for a wide range of musculoskeletal diseases and disorders in which replacement of bone is required, including osteoporosis, bone cancer, bone fracture, Paget's disease and bone allograft and autograft rejection.

"I am thrilled that University of Rochester and Taithera are working together to commercialize this technology," said Benoit. "I look forward to working closely with Taithera."

Biologic Therapies Safe and Effective in Injured Patients

Platelet-rich plasma (PRP) obtained from a patient's own body can be useful in speeding the healing of soft tissue injuries, or as part of a post-surgery course of therapy, according to research conducted by Michael Maloney, M.D., Chief of UR Medicine Sports Medicine.

Maloney's ongoing research involves both PRP and stem cell therapies, and their effectiveness in treating athletes of all ages, levels and abilities.

"We've had more than eight years of experience with PRP," he said. "It's a combination of PRP and other components that we administer to a site of injury or surgical repair, or arthritis."

The source of PRP is the patient—the plasma is obtained through a blood draw, which technicians then centrifuge to produce a concentration of platelet cells and growth factors. The plasma comes from the patient's own body, so there are no compatibility issues or fears of infection or rejection.

"Our experience with PRP began with soft tissue injuries and how we treat tendons and ligaments," said Maloney. "In my practice, we did a prospective, double blind, randomized study where we enrolled athletes that had sustained a first-time grade II or III lateral ankle sprain. We treated one group with a PRP injection, and the other with saline injection. While functional testing showed equivalent outcomes, there was a clear decrease in length of time to return to sport participation in the PRP group. PRP is getting our athletes back

on the field more quickly. We are using people's own cells to relieve symptoms and create a more functional joint."

Since the study results, Maloney has used PRP injections for rotator cuff and meniscus injuries, as well as injections following a surgical intervention. "We also use it to treat arthritis in a joint, such as the knee, hip and shoulder," he said. "When studied at the cellular level, PRP stimulated the patient's own cells to make hyaluronic acid, increased local vascularity and provided an anti-inflammatory and pain relieving effects. European studies have compared PRP and hyaluronic acid, and the PRP group demonstrated a better response."

The next phase of the exploration of biologic therapies includes stem cells, Maloney said. "Stem cells have the ability to differentiate or become other cells. People have been using stem cell injections to positively impact healing tissue and surgically repaired tissue, and to reverse some of the processes in arthritis. We are using the stem cells from the person's body (accessed from bone marrow) for their own treatments."

While research is not keeping up with the application of this therapy, patient demand has pushed UR Medicine Orthopaedics to provide this service. "Our personal experience with stem cells is anecdotal, but having done PRP and stem cells for over eight years, there's no question that patients are seeing a benefit from their biologics," Maloney said. "In a surgical setting, their pain is dramatically less, and it aids in a more comfortable and quicker perceived recovery."

Perry Initiative: Local Girls Explore Orthopaedics

Despite the rising number of women entering medical and graduate school, women make up only seven percent of practicing orthopaedists in this country. Each year, URM's Department of Orthopaedics works to improve those numbers by supporting The Perry Initiative, a nationwide program to inspire young women to become leaders in the fields of Orthopaedic Surgery and Engineering. URM's Department of Orthopaedics, whose complement of women surgeons is nearly double the national average, hosted a Perry Initiative workshop for 40 young women in high school and in their first year of medical school in January 2016. The young women got hands-on practice with power tools used in orthopaedic surgery, and learned about the profession from lead instructor Emily Carmody, M.D., Associate Professor of Orthopaedics and Judy Baumhauer, M.D., M.P.H., Professor and Associate Chair of Academic Affairs for the Department of Orthopaedics.



Metro Footcare Becomes UR Medicine Podiatry

On March 1, 2017, the four podiatry practices of Metro Footcare became a division of UR Medicine's Department of Orthopaedics and Rehabilitation. The well-established practice is now known as UR Medicine Podiatry, bringing more than two decades of experience to the UR Medicine health system.

UR Medicine Podiatry will offer specialty care in diagnosis and treatment of foot disorders, and provide both nonsurgical and surgical care. Its podiatrists care for bone, joint, ligament, muscle and tendon problems of the foot, including diabetic conditions, fractures, gout, heel pain, treatment of bunions, calluses and warts; and fitting patients for orthotics.

"Podiatry services are a valuable addition to UR Medicine Orthopaedics and Rehabilitation's complement of services," said Adolph S. Flemister, M.D., Chief of Orthopaedics' Foot and Ankle division. "This will provide patients and their referring physicians with a single source for the most advanced and comprehensive range of services concerning the foot and ankle. Additionally, patients and referring physicians who have received excellent support from Metro Footcare in the past will see new benefits as podiatry integrates with UR Medicine's information technology enterprise. Access to UR Medicine's electronic medical record system and MyChart, as



well as appointment scheduling and patient billing systems, will deliver enhanced efficiencies and information-sharing capabilities to streamline service and improve patients' experience of care."

The practice includes podiatrists pictured above: David High, D.P.M., F.A.C.F.A.S.; Michael Gruttadauria, D.P.M.; Ayaz Habib, D.P.M., and Pearce Sloan, D.P.M., F.A.C.F.A.S.

CMSR Trainees Receive Awards at the ORS 2017 Annual Meeting

Two CMSR trainees received New Investigator Recognition Awards (NIRAs) at the Orthopaedic Research Society (ORS) 2017 annual meeting.

Dr. Masahiro Ishikawa, a postdoctoral fellow in Dr. Edward Schwarz's lab, received a NIRA for his presentation entitled "Elucidating the Mechanism of Anti-IsdB Antibody-Mediated *S. aureus* Sepsis and Death following Surgical Site Infection in a MRSA Implant-Associated Osteomyelitis Model."

Yuchen Wang, a Ph.D. candidate in Dr. Danielle Benoit's lab, received a NIRA for her presentation entitled "Delivery of β -Catenin Agonists via Targeted Nanoparticles to Enhance Fracture Healing."

NIRAs are presented to ten trainees for their work as graduate students and postdoctoral fellows. The NIRA competition commences with an open call for scientific abstracts submitted for presentation at the ORS Annual Meeting. The top 40 scoring abstracts are selected for oral podium and poster presentations, and the ten best presentations are awarded NIRAs, which includes a \$500 cash prize.

dSports Summit 2017

UR Medicine's second dSports Summit kicked off with a resounding success on August 1st at the Memorial Art Gallery. The one-day conference explored the importance of mindfulness, nutrition and physical performance for athletes and sports enthusiasts and was complemented by exciting new technologies and innovations from expo vendors and sponsors including Wegmans, Muse, MC10 and Helo. The event was grounded by this year's keynote speaker and NFL Hall of Famer Jim Kelly. Kelly's passionate talk about his rise to the big leagues and resiliency when confronting personal loss and a

cancer diagnosis was both deeply moving and inspirational. Other guest speakers included Dr. Bill Moreau, Managing Director, Sports Medicine Division, US Olympic Committee; Dr. Jason Batley, US Olympic Team Certified Physician; Brad Thyroff, former ATP World Ranked Tennis Player and Hitting Partner for Venus and Serena Williams; Richard Kaplan, CEO CurAegis Technologies and Leland Hardy, former professional boxer and sports agent. Congratulations to all on a successful event!



Chief of UR Medicine Sports Medicine, Michael Maloney, M.D. introduces NFL Hall of Famer and 2017 dSports Keynote Jim Kelly.



Student athletes jumped right in to this year's dSports Summit and had a great time doing it!



Local high school athletes take part in the dSports Expo and stop by the Wegmans table.



How do you prepare and compete for the World Games? Dr. Bill Moreau, Managing Director of the US Olympic Committee Sports Medicine Division provided the answers at this year's dSports Summit.

Briefs and Faculty Accomplishments

Voloshin Presents at Chinese Orthopaedics Meeting

Ilya Voloshin, M.D., Chief of the Shoulder and Elbow division, was invited to lecture on repair of large rotator cuff tears at the Chinese Orthopaedic Association (COA) meeting in Beijing in late 2016. The American Academy of Orthopaedic Surgeons (AAOS) represented the United States as a guest nation at the COA conference, attended by more than 350 physicians from China and other nations. The program included lectures, case presentations and discussion. In addition to Voloshin, other AAOS faculty presenters included Dr. William N. Levine of New York Presbyterian/Columbia University Medical Center and Dr. Bradford O. Parsons of Mt. Sinai Hospital.

Dr. Voloshin also was invited as faculty to present on acromioclavicular joint dislocations for the Arthroscopy Association of North America's specialty day at the AAOS annual meeting, March 14-18 in San Diego. The event drew more than 14,000 participants worldwide.



Burton Named Pioneer of Hand Surgery

Richard I. Burton, M.D., has been named a Pioneer of Hand Surgery by the International Federation of Societies for Surgery of the Hand. Hand surgeons from around the world nominate recipients who are recognized leaders in the field and have contributed to the

advancement of hand surgery nationally and/or internationally. The award, given every three years, was presented at the organization's meeting in Buenos Aires.

Burton is the Emeritus Marjorie Strong Wehle Professor and Chair of Orthopedics, and emeritus senior associate dean for Academic Affairs. He joined the Medical Center faculty in 1974, and among his many contributions to hand surgery is a procedure for arthritis of the thumb—an international standard of care known as the Burton Procedure.

"Many people at national meetings have come up to me to say that of all the operations they do, this is the one where they have the greatest confidence telling patients they're going to see a good result," Burton said. "Other surgeons say it's their favorite operation to perform because patients do so well."

Burton recently got to experience the Burton Procedure's advantages personally, undergoing the treatment on his right thumb in August. His surgeon was Richard J. Miller, M.D., Professor in Orthopaedics. Miller was a chief resident and fellow who collaborated with Burton in the 1970s to develop the procedure.

Faculty Honored for Paper on PROMIS

As faculty members work to make patient-reported outcomes a standard of care across the ambulatory enterprise, they have collected PROMIS data from more than 75,000 patients through the use of the UR VOICE system (University of Rochester Validated Outcomes in Clinical Experience). Now, some of those faculty members will be collecting something else – an award for a paper about the system's effectiveness.

"Can Initial PROMIS Scores Predict Outcome for Foot and Ankle Patients?" will receive the American Orthopaedic Foot & Ankle Society's 2016 J. Leonard Goldner Award, which goes to the best basic science paper accepted for presentation of the year and recognized at the annual meeting. The authors include Bryant Ho, M.D., an orthopaedic Foot and Ankle fellow; Adolph S. Flemister, M.D., professor and clinical associate chair of Orthopaedics; John P. Ketz, M.D., Assistant Professor of Orthopaedics; Benedict F. DiGiovanni, M.D., Professor of Orthopaedics; Irvin Oh, M.D., Assistant Professor of Orthopaedics and Judith F. Baumhauer, M.D., M.P.H., Professor and Academic Associate Chair of Orthopaedics.

This research concludes that there are cut-off scores for PROMIS physical function and pain interference identified within a large foot and ankle practice that predict pre-operatively that a patient would or would not benefit from surgery.

CMSR Arthritis Investigators Recognized at the 2017 OARSI Meeting in Las Vegas

Abstracts submitted by Fadia Kamal, Ph.D. and Eric Schott, Ph.D. were among the nine highest rated at the 2017 Osteoarthritis Research Society International Conference held in Las Vegas, Nevada, April 27-30. They both presented their work during the Award and Keynote Plenary session at the opening of the conference, and were announced as Young Investigator Travel Award winners at the conclusion of the session.

Kamal, a Research Assistant Professor in the Department of Orthopaedics, presented her groundbreaking work identifying Gbeta/gamma and its regulation of G-protein coupled receptor signaling as a novel therapeutic target in post traumatic osteoarthritis.

Schott, a trainee in the Department of Pathology, described his findings implicating the gut microbiome in the pathogenesis of osteoarthritis in the context of obesity, and described how manipulation of microbial communities is protective.

Both were provided \$1,000 to defray travel expenses and are to be featured on the society's website.

Orthopaedic Alumni Reunion brings Endowment to Department

The biennial Meeting of the University of Rochester Orthopaedic Alumni took place at the Ballantyne Hotel and Resort in beautiful Charlotte, North Carolina. The event, which ran from April 6-9, was a perfect opportunity for our alumni to come together and reconnect after many years with faculty, and residents both old and new.

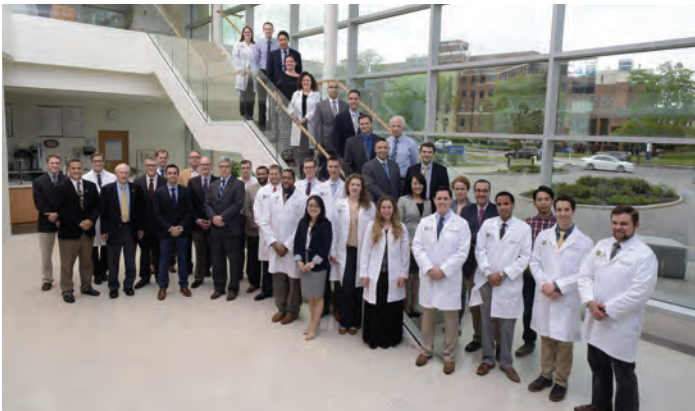
The success of the event can be glimpsed at in the many positive reactions from all of those who attended. They spoke highly of the excellence of the program, the "fantastic lectures," and a particular shout out was reserved for Dr. Paul Rubery, Marjorie Strong Wehle Professor of Orthopaedics and Chairman, Department of Orthopaedics and Rehabilitation, whom one attendee commented, "should give the UR history talk at every reunion meeting in the future."

To cap off the wonderful event, Dr. William and Judy Thorpe established an endowment in the amount of \$100,000 to support the DeHaven Skills Lab, in honor of Dr. Ken DeHaven. Thorpe referred to DeHaven as his "role model" and highlighted the influence of the orthopedic surgeons both during his residency and throughout his career. Dr. and Mrs. Thorpe were very impressed and moved by the reunion itself where they wrote, "Meeting with fellow resident graduates, young residents, recent graduates and present faculty was, for both Judy and myself, an exceptional experience. Truly, the UR Residency Program is thriving and in good hands for the future. We hold Rochester, our birthplace, warmly in our hearts."

For more information on contributing to the Fund or making a gift to UR Medicine's Department of Orthopaedics, contact Dianne Moll at dmoll@admin.rochester.edu

28th Annual R. Plato Schwartz, M.D. Lectureship

The University of Rochester School of Medicine and Dentistry hosted the 28th Annual R. Plato Schwartz, M.D. Lectureship on May 19-20, 2017. The event, which was first hosted in 1989 to honor R. Plato Schwartz, M.D., brought together new and advanced members of the medical world. Chief residents were on hand to present and defend their theses and members of the Orthopaedics faculty showcased their current work. The Schwartz Banquet highlighted the numerous achievements of the graduating chief residents, while the event touched on various aspects of musculoskeletal discovery, orthopaedic advancement and ABOS exam areas of concentration.



Promotions



Emily Carmody, M.D. was promoted to Associate Professor.



John Ketz, M.D. was promoted to Associate Professor.



Addisu Mesfin, M.D. was promoted to Associate Professor.

Residency and Fellowship Update

Three fellows completed their one-year fellowship on July 31: Michael Anderson (Foot and Ankle Fellow), Matthew Cavo (Hand Fellow) and Nicholas Pearson (Sports Fellow).

Six Chief Residents graduated from UR School of Medicine on June 25



Top Left: **Dr. Bilal Mahmood** will begin a fellowship in Hand and Upper Extremity Surgery at Hospital for Special Surgery; Top Center: **Dr. Raymond Kenney** will begin a fellowship in Sports Medicine at the University of Rochester; Top Right: **Dr. Robert Mason** will begin a fellowship in Hand and Upper Extremity at Wake Forest Baptist Medical Center in Salem, NC; Bottom Left: **Dr. Rami El-shaar** will begin a fellowship in Sports Medicine at Kerlan Jobe Orthopaedic Clinic in Los Angeles, California; Bottom Center: **Dr. Lucas Nikkel** will begin a fellowship in Adult Reconstruction at Duke University; Bottom Right: **Dr. Wenjing Zeng** will begin a fellowship in Hand and Upper Extremity at the University of Cincinnati.

Seven new interns started at URSMD on June 19th:

- Andrew Liu**
Sidney Kimmel Medical College at Thomas Jefferson University
- Bowen Qiu - Research**
University of Massachusetts Medical School
- David Quinzi**
State University of New York Upstate Medical University
- Steven "Andy" Samborski**
University of Minnesota Medical School
- Matthew St. John**
University of Rochester School of Medicine and Dentistry
- Eric Vess**
University of Virginia School of Medicine
- Zachary Zmich**
Jacobs School of Medicine and Biomedical Sciences at the University at Buffalo

Five new fellows started at URMSMD on August 1st:

- Sophia Davis** - Foot and Ankle Fellow (Residency-Inspira Health Network, Vineland, NJ)
- Eric Emanski** - Spine Fellow (Residency- Penn State Milton S. Hershey Medical Center, Hershey, PA)
- Raymond Kenney** - Sports Fellow (Residency-University of Rochester, Rochester, NY)
- Michael Morris** - Hand/Upper Extremity Fellow (Residency-Wayne State University, Detroit, MI)
- Christina Seifert** - Trauma Fellow (Residency-New York Medical College, Valhalla, NY)

UR MEDICINE ORTHOPAEDIC AND REHABILITATION FACULTY

ARTHRITIS AND LOWER EXTREMITY JOINT REPLACEMENT

Rishi Balkissoon, M.D., M.P.H.
Christopher J. Drinkwater, M.D. (*Chief*)
John G. Ginnetti, M.D.
Catherine A. Humphrey, M.D.
Mark H. Mirabelli, M.D. (*non-surgical*)
Thomas G. Myers, M.D.
Jennifer H. Paul, M.D. (*non-surgical*)
Benjamin F. Riccardi, M.D.
Lucien M. Rouse, M.D.
Gillian Soles, M.D. (*Hip*)
Nicole A. Strong, D.O. (*non-surgical*)

FOOT AND ANKLE

Judith F. Baumhauer, M.D., M.P.H.
Benedict F. DiGiovanni, M.D.
Adolph Samuel Flemister Jr., M.D. (*Chief*)
John P. Ketz, M.D.
Irvin Oh, M.D.

GERIATRIC FRACTURE CARE

Kyle T. Judd, M.S., M.D.

HAND AND WRIST

Ronald M. Gonzalez, D.O.
Warren C. Hammert, M.D. (*Chief*)
Richard J. Miller, M.D.
David J. Mitten, M.D.
Danielle M. Wilbur, M.D.

METABOLIC BONE DISEASE

Emily E. Carmody, M.D.

ORTHOPAEDIC TRAUMA

John T. Gorczyca, M.D. (*Chief*)
Catherine A. Humphrey, M.D.
Kyle T. Judd, M.S., M.D.
John P. Ketz, M.D.
Gillian L. Soles, M.D.

PEDIATRIC ORTHOPAEDICS

P. Christopher Cook, M.D.
Natasha O'Malley, M.B.B.Ch., M.Sc.
James O. Sanders, M.D. (*Chief*)
Paul T. Rubery, M.D. (*Department
Chair; Scoliosis*)

PODIATRY

Michael Gruttadauria, D.P.M.
Ayaz Habib, D.P.M.
David E. High, D.P.M., F.A.C.F.A.S.
Pearce Sloan, D.P.M., F.A.C.F.A.S.

SHOULDER AND ELBOW

Robert D. Bronstein, M.D.
Brian D. Giordano, M.D.
John P. Goldblatt, M.D.
Michael D. Maloney, M.D.
Richard J. Miller, M.D.
Gregg T. Nicandri, M.D.
Ilya Voloshin, M.D. (*Chief*)

SPINE CENTER

Clifford R. Everett, M.D., M.P.H. (*non-surgical*)
Donna G. Ferrero, M.D. (*non-surgical*)
Emmanuel N. Menga, M.D.
Addisu Mesfin, M.D.
Robert W. Molinari, M.D. (*Chief*)
John Orsini, M.D. (*non-surgical*)
Rajeev K. Patel, M.D. (*non-surgical*)
Paul T. Rubery, M.D.
James O. Sanders, M.D. (*Peds Scoliosis*)
David P. Speech, M.D. (*non-surgical*)

TUMOR SERVICES

Emily E. Carmody, M.D.

SPORTS MEDICINE

Robert D. Bronstein, M.D.
Brian D. Giordano, M.D.
John P. Goldblatt, M.D.
Maria Karipidis Pouria, M.D. (*non-surgical*)
Michael D. Maloney, M.D. (*Chief*)
Sandeep Mannava, M.D., Ph.D.
Mark H. Mirabelli, M.D. (*non-surgical*)
Gregg T. Nicandri, M.D.
Katherine H. Rizzone, M.D. (*non-surgical*)
Lucien M. Rouse, M.D.
Sarah Vengal, M.D. (*non-surgical*)
Ilya Voloshin, M.D.

Visit our website at ortho.urmc.edu

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