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## The Intersection of Medicine, Art and Engineering

**W**hen it comes to complex reconstructive joint surgery at Rhode Island Hospital's Orthopedics Institute, there's nothing "off-the-shelf" about the approaches used by our orthopedic surgeons. In what's been described as the point where medicine, art and engineering intersect, patients have access to treatment that is revolutionizing orthopedics in our region through impeccable planning and preparation, artisan engineering, and the latest technology.

"Our patients don't need to travel for world class orthopedic care. We provide a full spectrum of specialized services, close to home here in Rhode Island and I'm grateful to be a part of that," says Derek R. Jenkins, MD, orthopedic surgeon and assistant professor at The Warren Alpert Medical School of Brown University.

Dr. Jenkins came to Rhode Island Hospital in 2015, recruited from the Mayo Clinic in Minnesota. He specializes in adult reconstruction of the hip and knee with the goal of creating joint replacements that last longer and perform better for active patients with arthritis. His focus includes revision surgeries that address complex problems from infected, failed or painful joint replacements.

But medical school wasn't Dr. Jenkins' original plan, and his approach to surgery is a product of that. While he pursued an engineering degree at Dartmouth, Dr. Jenkins' lab research focused on retrieved orthopedic implants that failed. Challenged from a mechanical standpoint to determine why an implant failed or wore out and how to make it better, he found his life's calling.



Dr. Jenkins

"For me, this is more than a job," says Dr. Jenkins. "I wanted to be part of a community of talented, like-minded individuals working collaboratively to create exceptional outcomes none of us could do alone. And that's exactly what I've found here."

Fabricating implants with the use of computer model software, he solves one-of-a-kind problems, utilizing resources available as part of a large academic medical system. One of those resources is Tantalum; a rare earth element with the structural, functional and physiological properties most similar to human bone. Used to create porous trabecular metal, with an excellent rate of bony in-growth, it is a great intermediary between a patient's own bone and an orthopedic implant. It is especially beneficial for patients with complex joint cases or abnormal or missing bone.



**Rhode Island Hospital**

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## Meet Steve Johnson

**T**wo years ago, Steve Johnson awoke with excruciating pain radiating from each knee. Unable to stand, the sharp aches were similar to what Steve felt prior to his bilateral knee replacements in 2008. This time however, the pain, literally, appeared overnight.

Though Steve and his wife Christine live in Maine part of the year, their local physician suggested Steve come to Rhode Island Hospital for his care. “He said, ‘I worked with Dr. Jenkins at the Mayo Clinic; he’s amazing. That’s the guy you need to see,’” recalls Steve, an Army and Vietnam War veteran.

“For our doctor to recommend Dr. Jenkins, we knew he had to be special,” adds Christine.

At Rhode Island Hospital, imaging of Steve’s knees revealed tiny fragments of plastic used during his first procedure that deteriorated and broke free. New knees would need to be built. But complicating Steve’s situation were sizable defects in the surrounding bone, the result of years of military training and passions for cycling and skiing.

Using porous trabecular metal cones, Dr. Jenkins filled the voids of bone in Steve’s knees, providing the foundation on which to create a lasting interface between his bone and new knees. To ensure the implants would tolerate the activity of Steve’s lifestyle, his knees were created with pieces from multiple implant manufacturers. It’s an option not available to all



Steve and Christine Johnson

surgeons, as hospitals often have a contract with a single manufacturer. But because Lifespan hospitals have one of the busiest orthopedics practices in the region, the volume of implants necessitates relationships with multiple manufacturers.

Now 18 months past his right knee revision, and nearly a year since his left, Steve is back to bicycling, yard work, walks on the beach with Christine, and he’s taken up golf. “What Dr. Jenkins and that hospital did for me was amazing,” says Steve. “There’s nothing I can’t do.”

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## Meet Rose D'Arezzo

In 2007, 71-year-old Rose D'Arezzo was struggling with knee pain when she decided to have both knees replaced. For the grandma who was happiest spending time with her six grandchildren, being pain free and back on her feet was a dream come true.

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—Derek R. Jenkins, MD

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Eight years later, in May 2015, debilitating pain struck Rose’s left knee. “I was so scared,” she said. “I’d never felt pain like that before.”

Rose wound up in Rhode Island Hospital’s emergency department, where doctors discovered an infection in her left knee

replacement, most likely caused by an infection elsewhere in Rose’s body.

Immediate surgery was necessary, but because of Rose’s age, her prior replacement, and needing to control the infection, her surgeon had multiple challenges.

“Anything that introduces bacteria into the blood stream, even a skin infection, can cause a joint infection, although exceedingly rare,” explains Dr. Jenkins. “The important thing is how we treat it.”

Rose’s old implant was removed and a temporary antibiotic-infused spacer was created to maintain the space it previously occupied. For most patients, once an infection heals, the spacer is removed during a second procedure to place a new knee implant. But for Rose, Dr. Jenkins combined the two surgeries into one, making a spacer durable and functional enough to be a long-term knee replacement.

“The Rhode Island Hospital orthopedics team is all about individualized treatment and doing what’s best for the patient,” says Dr. Jenkins. Using antibiotic cement like an artist molds clay, he recreated the bone Rose lost in her knee since her initial replacement to better support the spacer.

Two years later, the 81-year-old grandmother has nothing but praise for her team of caregivers. “I feel great and can stand in the kitchen without pain to cook with my grandchildren. And I have Rhode Island Hospital to thank.”



Rose and her grandchildren



## Meet Erik Silva

**D**iagnosed with juvenile rheumatoid arthritis as a child, 42-year-old Rhode Islander Erik Silva underwent surgery in Boston to replace his hips before his eighteenth birthday. By the time he turned 25, both his knees had also been replaced. While benefiting from the best technology at the time, Erik knew his complex physiology would eventually lead him back to the operating room.

“Patients like Erik are why I came to Rhode Island,” says Dr. Jenkins. “He has the most severe juvenile rheumatoid arthritis I’ve ever seen, but he doesn’t let it stop him. He goes to work every day and is an inspiration to us all.”

Replaced in 1992, Erik’s hips were expected to last 20 years. While they exceeded that timeframe, an annual implant check-up revealed new bone deterioration in Erik’s pelvis, compromising the area stabilizing his hip implants.



Erik with Dr. Jenkins

“The pain on my left side was unbearable,” says Erik. “I’d lost confidence in walking because my leg would dislocate and give out under me.”

Dr. Jenkins mapped out his plan, creating computer-aided templates based on x-rays of Erik’s hips and pelvis. He immediately turned to Tantalum. “Tantalum augments didn’t exist at the time of Erik’s previous procedures,” says Dr. Jenkins. “I remember telling him he’d have stronger hips than me once we were done operating on him.”

Erik’s left hip was reconstructed in August 2015; his right in March 2017.

“Before my left hip was redone, I couldn’t walk,” recalls Erik. “But shortly after, I was walking with confidence and hope to be even better after my right side completely heals. I was a puzzle Dr. Jenkins had to put back together, only he did it better than the original. I’m so grateful to my team at Rhode Island Hospital.”

In addition to reconstructive joint surgeries, physicians at the Orthopedics Institute are experts in hand, upper extremity and microvascular surgery, shoulder and elbow surgery, spinal conditions, arthroscopic surgery, management of simple and complex fractures, bone and soft tissue tumors, and more. Comprehensive services are full circle, with rehabilitation specialists who work with patients after surgery and often before to help prevent the need for surgery.

“For each and every patient, our teams across the entire Lifespan system work together to provide exceptional surgical and rehabilitative treatment and care,” says Dr. Jenkins. “What we have here is amazing.”

