

# Leading the way in joint replacement surgery

By Tom O'Connor

The Baby Boomers are getting older.

It's a trend that promises to have a ripple effect throughout society, but especially so in health care.

Perhaps no area of health care will be impacted more than orthopaedic surgery. As the Boomers age and their knees and hips start to wear out, it promises to keep orthopaedic surgeons busy for many years to come.

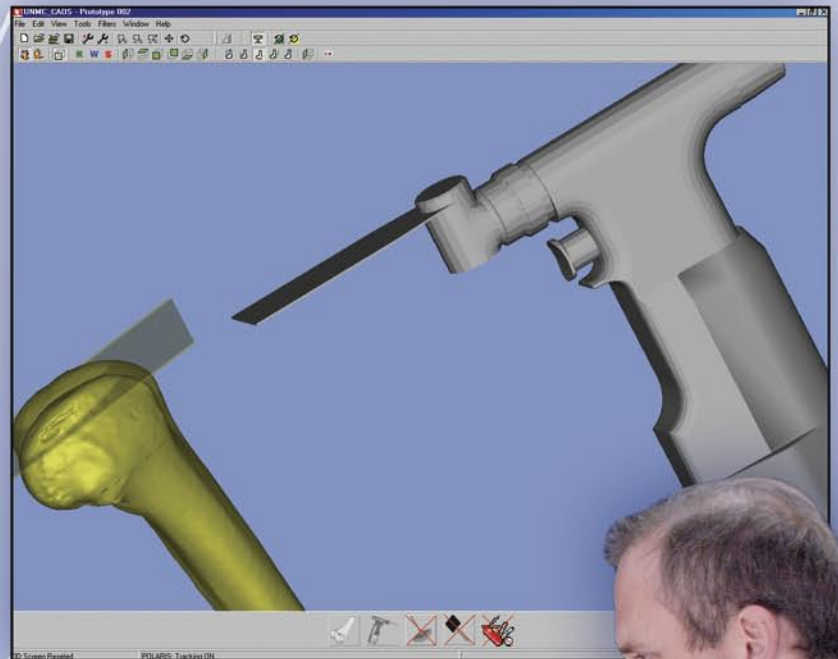
To meet the increased demand for joint replacements, UNMC and its hospital partner, The Nebraska Medical Center, are well positioned as the place to come for quality care.

"Our orthopaedic surgeons will do 700 joint replacement surgeries a year," said Kevin Garvin, M.D., professor and chairman of the UNMC Department of Orthopaedic Surgery & Rehabilitation. "Experience is critical in joint replacement surgery. The more you do, the better you get. Unfortunately, 80 percent of joint replacement surgeries are done by surgeons who do less than 20 procedures per year. That's why so many fail and need to be re-done."

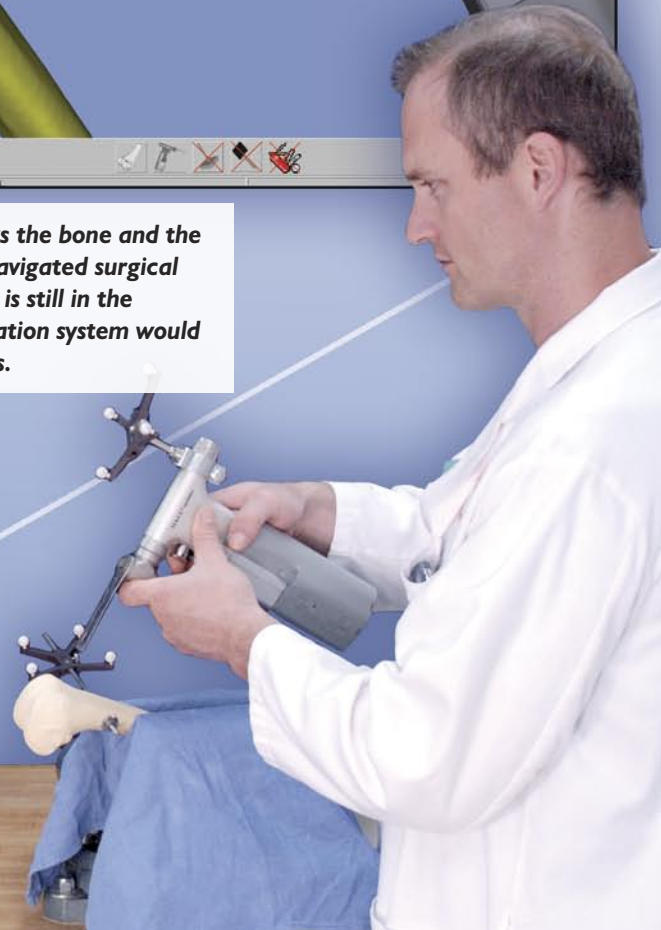
Dr. Garvin said the number of re-do joint

replacement surgeries has increased by 10 percent and that about half of UNMC's joint replacement surgeries are now re-do procedures.

UNMC and The Nebraska Medical Center have surged to the forefront in joint replacement surgery, he said, because



**UNMC engineers are developing a computerized surgical system that tracks the bone and the surgeon's hand-held instruments to guide them in knee replacement. This navigated surgical system was invented at the orthopaedic surgery laboratories at UNMC and is still in the research and development stage. By improving surgical precision, the navigation system would allow patients to recover more quickly and prolong the life of artificial joints.**



they are constantly striving to use research and technology to provide the best and most advanced care for patients. “Research is the thing that separates academic medical centers from other institutions,” Dr. Garvin said. “We are truly committed to looking for ways to improve joint replacement surgeries.”

UNMC’s joint replacement research is a team effort involving the surgeons, Dr. Garvin and Todd Sekundiak, M.D., and engineers led by Hani Haider, Ph.D., associate professor in the Department of Orthopaedic Surgery & Rehabilitation and Director of its Biomechanics Laboratory at the Scott Technology Center located on the south border of the University of Nebraska at Omaha campus.

The team is striving to develop a novel computer navigation system that will improve surgical precision, help patients recover more quickly and prolong the life of the artificial joints.

Creating surgery simulation and navigation software is quite complicated, said Dr. Haider, who was hired with money donated to UNMC by Omaha Philanthropist Chuck Durham. It requires making three-dimensional computer bone models identical to those of the patient based on their radiology CT images, and incorporating a computer-driven camera navigation system that allows surgical instruments and bones on the screen to move realistically.

Through mathematical calculations programmed into the computer, the surgeon’s hand movements are tracked and “image-guided” to allow for faster, more accurate bone cutting and alignment of implants with less trauma to soft tissue. Every time the surgeon turns or jiggles the hand-held saw, the movement is mirrored on a computer connected to the camera, said Mr. Andres Barrera, a Computer Science Master’s graduate from The Peter Kiewit Institute of the University of Nebraska at Omaha, who is now a full-time research associate in Dr. Haider’s team.

“Joint replacements are very complex,” said Dr. Haider, “They are all about intricate implant alignment and soft-tissue tuning, as well as selection for good size and fit. The slightest inaccuracy can compromise the implant’s performance and expected life in the patient. The surgeons are truly artists, as well as scientists.

“We are committed to be innovators in this field. We’ve been working on the computer navigation system for four years. It’s a long-term commitment to excellence, but we think it will be worth it in the long run.”

Since total joint replacements began in earnest in 1958, it has been an ongoing learning process. Technology has advanced the implants and made them more comfortable and last longer, and surgeons have been able to make smaller incisions and still produce a quality result.

Instead of the traditional 8- to 12-inch incision, UNMC surgeons are now making incisions as small as 2 ¾ inches and usually no more than five inches. Because of the smaller incision, surgeons can operate between muscles, tendons and ligaments, rather than cutting through these soft tissues. Much of the pain associated with joint replacement surgery and recovery is the result of severing these tissues.

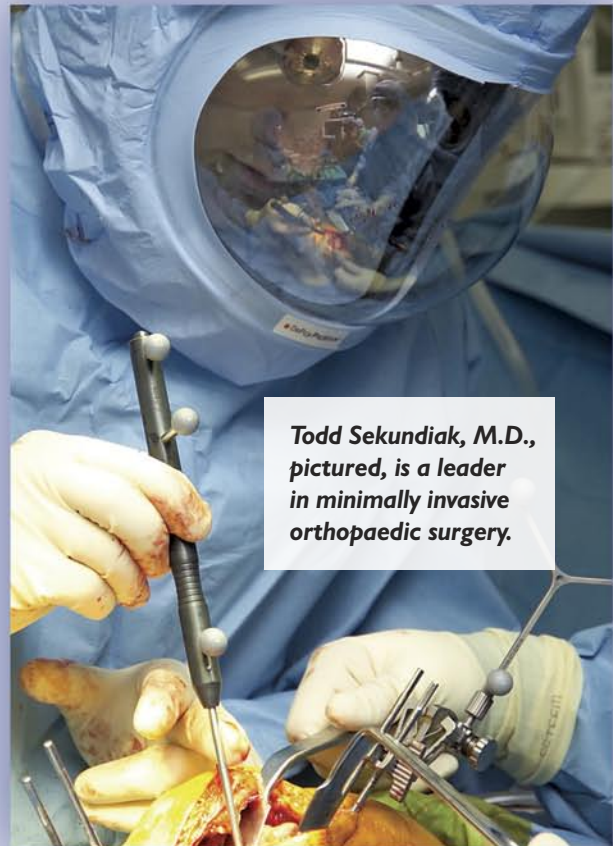
Because of the heavy blood loss and tissue damage associated with traditional joint replacement surgery, patients

often spend up to a week in the hospital following surgery, are unable to put any weight on their leg for six-to-eight weeks, and face up to four months of rehabilitation.

“The smaller incisions have changed our management of patients,” Dr. Garvin said, “not because of the incision but because of the post-operative course. We’ve learned how to better manage pain post operatively and allowed patients to increase their activity more rapidly.”

UNMC was recently selected to be the third U.S. training site for Zimmer Holdings, Inc., the worldwide leader in minimally invasive joint replacement surgery. The other U.S. training sites for Zimmer are at Johns Hopkins University and the Tucson Orthopaedic Institute.

“We are excited about the prospect of combining what we have learned about minimally invasive orthopaedics with the experience of Zimmer and its network. It is a



**Todd Sekundiak, M.D.,  
pictured, is a leader  
in minimally invasive  
orthopaedic surgery.**

tremendous compliment to the quality of our program,” said Dr. Sekundiak, who is assistant professor in the UNMC Department of Orthopaedic Surgery & Rehabilitation and the person who will train other orthopaedic surgeons to use Zimmer’s minimally invasive technologies and participate in product refinement.

Dr. Garvin said UNMC also has created a Nano-Biotechnology Laboratory in the Scott Technology Center under the direction of Professor Fereydoon Namavar, Sc.D. The lab has assembled a state-of-the-art experimental system that can produce nanocrystalline super hard coatings to protect and reduce the wear of metallic artificial implants.

“By coating the implants, the hope is that they won’t wear out and won’t have to be replaced,” Dr. Garvin said. “It is extremely exciting and holds great promise.” ■