

UNMC Receives International Research Award in Joint Replacement Technology



Dr. Hani Haider
Director, Biomechanics Laboratory

The University of Nebraska Medical Center received an international joint replacement society's top research award earlier this month.

The International Society for Technology in Arthroplasty (ISTA) presented the HAP Paul Award to UNMC at the ISTA's annual symposium in Kyoto, Japan, on Oct. 1. The award is the international group's highest honor for distinguished research. UNMC received the award for its work in minimally invasive, computer-assisted joint replacement surgery.

"Our orthopaedic surgeons perform about 700 joint replacement surgeries a year," said Kevin Garvin, M.D., professor and chair of UNMC's Department of Orthopaedic Surgery and Rehabilitation, and chief of the joint replacement service. "Research is the thing that separates academic medical centers from other institutions. We are truly committed to looking for ways to improve joint replacement surgeries."

Hani Haider, Ph.D., director of the Orthopaedics Biomechanics Surgery Research Laboratory at UNMC, said the award-winning research involves a revolutionary technology developed recently in the UNMC orthopaedic laboratories. Funds for the research were donated by Christina M. Hixson of the Lied Foundation. The research was outlined in a paper entitled, "Minimally Invasive TKR Surgery through Navigated Freehand Bone Cutting - Assessed by 3d Analysis of Surface Finish and Alignment," which will be published by ISTA as a special article in the "Journal of Arthroplasty."

The research, Dr. Haider said, allows surgeons to use computer image-based navigation (similar to GPS technology, but in the operating room) to guide them in freehand cutting of bones to prepare the bones for insertion of implants for joint replacement. Conventional systems use complicated and cumbersome mechanical jigs to align the cutting instruments. New commercial navigated systems still use these jigs, and are therefore still as invasive.

Dr. Haider, first author of the study, proposed an alternative to the normally used cutting jigs. His idea was for surgeons to "cut the bone freehand, while the computer gives the surgeon meaningful and dynamic graphical feedback of where to cut and whether he/she is cutting too much or too little," he said.

"Our study showed that navigated freehand bone-cutting has the potential to produce easier, faster, cheaper and less invasive total knee replacement procedures," Dr. Haider said.

UNMC's award winning research team included Dr. Haider, Research Associate Andres Barrera, Engineering Technician Benjamin O'Brien, and orthopaedic surgeons Drs. Todd Sekundiak and Kevin Garvin.

Earlier results of this research were presented at the American Academy of Orthopaedic Surgeons and have received wide attention in the last year at various international scientific conferences. UNMC has just signed a research contract with a multi-national orthopaedic manufacturing company to verify the feasibility of this concept prior to licensing for wide clinical and commercial use.

The HAP Paul Award was established to honor Howard A. Paul, D.V.M., a pioneer in surgical robotics and a charter member of ISTA. UNMC received \$5,000 for earning the award.

"We have a deep desire to develop robotics for joint replacement orthopaedic surgery and fulfill Dr. Paul's dream, but this will take some time to develop and to be able to produce tangible clinical benefits before it will

become widely accepted by surgeons,” Dr. Haider said. “Although we are not ready for clinic studies, the research creates the possibility for improved surgical accuracy, and safe and less invasive surgery with its inherent benefits.”

UNMC is the only public health science center in the state. Its educational programs are responsible for training more health professionals practicing in Nebraska than any other institution. Through its commitment to education, research, patient care and outreach, UNMC has established itself as one of the country's leading centers in cancer, transplantation biology, bioterrorism preparedness, neurodegenerative diseases, cardiovascular diseases, genetics, biomedical technology, ophthalmology and arthritis. UNMC's research funding from external sources is now more than \$72 million annually and has resulted in the creation of more than 2,400 highly skilled jobs in the state.