Findings from two current research studies will help shape the future of partial and total knee replacement surgery for patients all over the world.

This summer, Center for Hip & Knee Surgery orthopedic surgeons, as part of their involvement with the Joint Replacement Surgeons of Indiana (JRSI) Research Foundation, will be wrapping up research on their two most recent scientific studies of knee replacement implant designs and surgical techniques.

Michael Berend, M.D., is leading a team studying a specific prosthetic partial knee, the Biomet Oxford Partial Knee, evaluating options the surgeon has in placing the implant (from the size and orientation of the implant to the angle at which it is cemented into place) and how these options affect the overall outcome of the surgery. Specifically, the team of researchers is looking at how these surgical options affect how the tibia (shinbone) will handle the weight and stress (the “load”) it must bear when the patient uses his or her new knee after surgery.

Robert Malinzak, M.D., is leading a team studying a variety of different designs of fixed and rotating total knee replacement implants. His team is researching how different implants affect how the tibia handles load-bearing after implantation.

The studies are part of a collaborative research effort between the not-for-profit JRSI Research Foundation, the Center for Hip & Knee Surgery (CHKS) and Rose-Hulman Institute of Technology in Terre Haute. These organizations conduct their cooperative research at the Orthopaedic Biomedical Engineering Laboratory at Rose-Hulman.

Undergraduate biomedical engineering students, JRSI Research Foundation staff and the skilled CHKS orthopedic surgeons are able to combine expertise — the surgeon’s decades of clinical and biomedical orthopedic research expertise and the university’s students and faculty engineering knowledge — to study the science and medicine behind the success or failure of implants used in hip and knee replacements. The goal is to discover ways to improve implant design and surgical technique.

After the research is completed this summer, the teams of researchers will seek to publish the findings in peer-reviewed professional journals and present their findings at national conferences for orthopedic and biomedical engineering professionals.

“Sharing our findings with professionals in the field of orthopedics will allow orthopedic surgeons to change and improve surgery outcomes for patients for years to come,” said Dr. Malinzak. “Sharing our findings with professionals in biomedical engineering will allow implant manufacturers to apply the findings to implant design, with similar, long-standing effects on the future of orthopedic surgery.”

“It’s all geared toward improving patient outcomes,” said Scott Small, engineering director for the JRSI
that results from arthritis are important for the long-term success of knee replacements. The surgical team from CHKS was honored with the top award in surgical technique on this subject from The Knee Society.

In studying thousands of knee replacement outcomes, the team has developed the understanding of ideal alignment for each component of a knee replacement. The surgeons use the latest technologies, including modern instrumentation and hand-held computer navigation units.

“We believe in proven outcomes and the efficient, cost-effective and safe use of modern surgical techniques and technologies,” said CHKS surgeon Michael Berend, M.D.

The surgeons are recognized as leaders in the Midwest in joint replacement technologies and are honored to put their experience, compassion and knowledge to use to help you safely recover from joint replacement surgery.”

Long-running Success
The collaboration between the JRSI Research Foundation and Rose-Hulman has been in place since 2004, although JRSI has conducted clinical research dedicated to improving patient care and surgical techniques for many years previously. In the 2010-2011 academic year, the findings of the Rose-Hulman lab were presented at five national conferences, and eight peer-reviewed manuscripts were published or being considered for publication at the time of their annual report.

“The unique relationship with Rose-Hulman has allowed a true exchange of information, educational opportunities and scientific thinking between surgeons and students,” said Dr. Berend. “We have been able to combine our clinical expertise with more than 35,000 joint replacements with the latest engineering research techniques and experimental models. Many great things are on the horizon.”

Surgeons pioneer surgical techniques
(continued from cover)