PRACTICAL RESEARCH FOR EFFECTIVE PATIENT CARE

▲ Catherine G. Ambrose, PhD

For **Catherine G. Ambrose, PhD**, director of the Biomechanics Lab at the University of Texas Health Science Center, nothing about her work is theoretical. "In engineering, your goal is to try to create a product or process that will help someone with a very specific problem," said Dr. Ambrose, who is also an associate professor. "In our case, the problems are related to patient care."

Fortunately for orthopaedic patients, Dr. Ambrose has dedicated much of her time to finding a more practical and efficient way to treat osteomyelitis. About 12,000 cases of the infection are treated annually, and the risk of complications—even amputation and death—is high. Plus, it can be difficult to identify the specific bacteria causing the infection.

"There are a lot of patients who have chronic infections that no amount of antibiotic treatment is clearing up," Dr. Ambrose said. "If we had a clear picture of what kind of bacteria were in these wounds, it would be a lot easier to eradicate them."

TRACKING BACTERIAL CULPRITS

With support from an OREF Prospective Clinical Grant, Dr. Ambrose began working with a team of investigators to analyze tissue samples from patients treated for implant infections, septic arthritis or deep infections. The team identifies the various bacterial species present using a specific gene, 16S DNA, which is common to all bacteria but not found in mammalian cells.

The orthopaedic infections tend to be polymicrobial, said Dr. Ambrose, so the team is searching for possible patterns that would provide insight into how these infections progress. Such insights would not have been possible without the OREF grant, she said, which allowed the team to expand the number of patients involved in the study.

EXPANDING DISCOVERIES

Now, Dr. Ambrose and her team plan to apply for funding from the National Institutes of Health. Their proposal will combine data from the OREF-funded study with research data they've gathered on biofilms associated with implant-related infections and drug delivery systems to treat infections.

This work could potentially benefit patients who have diabetic foot ulcers or catheter infections, to name a few. Still, Dr. Ambrose finds particular satisfaction in helping orthopaedic patients because she was born with developmental dysplasia of the hip. She has endured several orthopaedic surgeries, and several members of her family also have this hereditary condition. "We spend a lot of time in orthopaedic offices," she said.

CONNECTING TO PATIENTS

Dr. Ambrose is passionate about translational research, not only for her own family, but for all patients. But the only way to connect lab work to orthopaedic surgeons in the operating room and patients in need of treatment, she said, is through significant financial support such as a grant from OREF.

When she speaks about her OREF-supported research to other scientists or surgeons, Dr. Ambrose reminds them that supporting current research will enhance the lives of future patients. "They will be treated more efficiently and more rapidly because the treating physicians will know exactly which bacteria are in their wounds." ■

THE SEARCH FOR STABILITY

COMPARING HIP IMPLANT PROCEDURES

One of the most memorable patients **Wael K. Barsoum, MD** ever treated came to him with a relatively avoidable problem.

The patient, a 40-year-old father of three, was frustrated by the instability of his hip replacement. He had endured several procedures in an effort to fix it, but to no avail.

"He couldn't participate in activities with his children because he feared that his hip would pop out," remembered Dr. Barsoum, vice chairman of the Department of Orthopaedic Surgery at Cleveland Clinic.

Dr. Barsoum and his team discovered the underlying problem was a malposition of the prosthetic components, which they were able to correct with one more surgery. The patient could finally chase his kids around without fear.

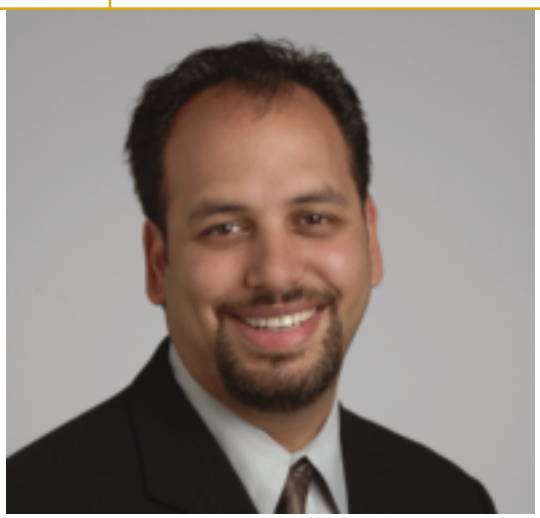
"It doesn't seem like a huge deal to us, but for the patient it really gives him his life back. It's a really big deal."

REPLICATING INSTABILITY

Joint replacement instability has been an interest for Dr. Barsoum since he decided to pursue a career as both a clinician and scientist. With the help of an OREF Research Grant, Dr. Barsoum and his team built a cadaveric robotic model to investigate the relative stability of two hip implant approaches: femoral head resurfacing and total hip arthroplasty (THA).

The robot model is fitted with cadaveric pelves in various conditions, including femoral head resurfacing and THA. The robot rotates the hip until impingement occurs, alerting researchers when the hip is about ready to dislocate.

Dr. Barsoum and his team are looking for several factors that influence hip implant stability, such as the condition of the surrounding soft tissue. They examine the head-to-neck ratio, the size of the ball relative to the size of the stem anchored to the femur, and jump distance—the maximum distance between the femoral head and the acetabulum before a joint dislocates.



▲ Wael K. Barsoum, MD

IMPROVING PATIENT EXPECTATIONS

Dr. Barsoum hopes to use the data gathered from this OREF-supported study to apply for a National Institutes of Health grant. But he said the information already gathered should give surgeons a clearer understanding of the outcomes of the two procedures, which will ultimately benefit patients.

In his clinical work, Dr. Barsoum said he often talks with patients who have researched hip replacement approaches on the Internet and may have incorrect or preconceived ideas. He notes that in most cases, orthopaedic surgeons are performing elective procedures that improve function, not save lives.

"It becomes more incumbent on us to be confident that we're providing patients with correct information and managing their expectations," he said. "If you perform a procedure that may not give patients the improvement they expected, they will perceive the outcome as a failure."

Dr. Barsoum explained that this is why research is so essential for patient care. "By building this model and testing our hypothesis, it gives me the ability to speak to my patients in a more objective fashion in terms of either dispelling a misconception or confirming a correct belief on their part."

Dr. Barsoum, who is also an OREF Order of Merit donor, said the OREF grant was indispensable in beginning his research. In fact, he said OREF's greatest strength is launching the careers of young researchers. ■