Department of Biomedical Engineering

ENGINEERING A HEALTHIER FUTURE

MARK EHRENSBERGER IS CREATING HEALTHIER IMPLANTS
Mark Ehrensberger, PhD: Eradicating Pathogens on Orthopaedic Implants

The number of orthopedic procedures requiring placement of metallic implants is increasing worldwide.

As the number of these implants rise, so do infections, which result in extended treatments and hospital stays, increased morbidity and mortality, and higher costs to the health care system.

One of the factors contributing to these infections are microorganisms that mature into biofilms on the implants and become highly resistant to antibiotics. The current gold standard for treating such infections involves removing the implant, administering local antibiotics until the infection is cleared and then replacing the implant—an approach that further exacerbates patients’ suffering by leaving them with biomechanical deficiencies until a second device is implanted.

Mark Ehrensberger, assistant professor of biomedical engineering and director of the Kenneth A. Krackow M.D. Orthopaedic Research Lab at UB, is developing a technology that aims to eradicate these biofilms without having to remove the implant. His approach focuses on disrupting the biofilms of problematic pathogens by delivering electrical stimulation directly to titanium implants.

While Ehrensberger, working with colleague Anthony Campagnari, professor of microbiology/immunology and medicine, has found that electrical stimulation alone reduces biofilm infections, they have reported that the biofilm is even more effectively eradicated when the treatment is delivered in combination with systemic antibiotic therapy. More compelling yet is their discovery that prophylactic delivery of their novel electrical stimulation prevents infections from becoming established in the first place.

“We are very excited about this technology that aims to provide patients with a much more effective treatment option, getting them back to their active lives faster after surgery,” said Ehrensberger. “Even better, it looks like the same treatment can be applied to most of the types of passivated metals used for orthopedic implants, so it seems to be widely applicable.”