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"Developing a new therapeutic approach to Improve Treatment of Periprosthetic Joint Infections Using a Novel, and Clinically Representative Hip Replacement Rat Model"

Periprosthetic joint infection (PJI) is a devastating complication that can result following total joint replacement (TJR) surgery. PJI is a source of significant clinical burden for patients as it can lead to loss of joint function, and in extreme cases, even death. In an age of antibiotic resistance, failure rates for standard PJI treatments are estimated to be as high as 40% at two years post-surgery. Consequently, PJI also represents a significant economic burden to the Canadian health care system, carrying with it a projected, annual global cost of $1.62 billion by 2020. Considerable evidence has shown the formation of microbial biofilm, a complex interconnected community of bacteria, on implant surfaces plays a key role in the antibiotic tolerance that leads to treatment failure. Our research team has demonstrated that combining the standard of care antibiotic therapy with bacteriophage can significantly reduce biofilm burden *in vitro* cell-based models. Therefore, the aim of our current research proposal is to take this innovative treatment approach one step closer to the clinic by evaluating its safety and efficacy in a novel, clinically-relevant PJI animal model. The main characteristics of our animal model replicates similar biomechanical features of the implant in human patients. We hypothesize that treatment of PJI in this animal model with the combination of antibiotics and phage will be more effective than either single agent alone, and will correlate to improved infection-free survival.