DEVELOPMENT OF A BIOABSORBABLE ACTIVE RELEASE ANTIMICROBIAL COATING FOR ORTHOPEDIC IMPLANTS

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Orthopedic implantations often create an opportunity for biofilm-related infections to arise. Patients infected with biofilm must often undergo additional surgeries for repair or replacement, which puts them at a greater risk of osteomyelitis, sepsis, and other complications including death. This study investigated the potential of an active release antimicrobial coating to eradicate methicillin-resistant *Staphylococcus aureus* (MRSA). MRSA is commonly found in the biofilm phenotype and is potentially fatal. A coating for orthopedic devices would reduce risks of infection and increase success rates. To test the potential of a combination coating of the antimicrobial agent, CZ-1-99, and Poly-co- lactic-glycolic acid (PLGA), a three-phase experimental process was developed. Phase one consisted of determining the minimum inhibitory concentration (MIC) of CZ-1-99 against planktonic bacteria, phase two consisted of determining the effective biofilm eradication concentration (EBEC), and phase three was to incorporate CZ-1-99 into PLGA and determine its initial efficacy against planktonic bacteria of MRSA. The MIC of CZ-1-99 was 5μg/mL. In the EBEC assay, a CZ-1-99 concentration of 400μg/mL was able to reduce biofilm by 6 $\log_{10}$ units. An addition of 10% CZ-1- 99 to the PLGA coating significantly impaired the growth of planktonic MRSA, but additional data will be needed to optimize the coating. The results of the three tests provided an indication that a CZ-1-99 may have promise to eradicate planktonic MRSA and further work will be needed to optimize its efficacy against MRSA in the biofilm phenotype.