Technology Opportunity

BACKGROUND OF THE INVENTION: It is estimated that approximately 65-80% of all human bacterial infections are considered to be biofilm related. Microbial biofilms are naturally tolerant of antibiotic doses up to 1,000 times greater than doses that kill planktonic bacteria. Microbial biofilms, communities of adherent bacteria or fungi embedded in a matrix of exopolymeric substances, represent a significant medical challenge, as they are highly resistant to disinfectants, antimicrobial agents, and immune defenses. Exopolysaccharides are the major component of the biofilm matrix, where they contribute to biofilm adhesion, architecture, and resistance. Biofilms form on biotic surfaces, such as lung epithelial cells or other organs, and abiotic surfaces including, but not limited to, medical devices, and implants, and are responsible for biofouling in industrial and commercial settings.

DESCRIPTION OF THE INVENTION: Scientists at Sickkids have identified novel therapeutic enzymatic compositions for degrading and inhibiting production of bacterial and fungal biofilms. These compositions explicitly target and degrade the exopolysaccharides produced by a number of pathogenic species including, but not limited to; Pseudomonas spp, Escherichia coli, Methicillin-resistant Staphylococcus aureus (MRSA), Acinetobacter baumannii, and Aspergillus fumagatus. This specificity allows for the selective dispersal of the pathogenic organism while eliminating off target effects including the disruption of the host microbiota. Low nanomolar quantities of each enzyme can be utilized as a prophylactic to prevent in vitro biofilm development. Additionally, similar quantities of enzyme result in the total biofilm biomass dispersal in less than 60 minutes. The enzymes have been demonstrated to protect lung epithelial cells from fungal damage prior to biofilm formation and toxicity studies using human lung fibroblasts IRM-90 cells indicate that milligram quantities of enzyme have no effect on mammalian cell viability. Dispersing of the biofilm, and release of the microbes into the planktonic – free swimming – state will increase the efficacy of existing antibiotics and the immune response. The current findings create a promising avenue for the development of these enzymes as novel therapeutics for the treatment of a wide variety of chronic infections, including pulmonary diseases (cystic fibrosis, invasive aspergillosis, and whooping cough), and wounds which affect 1-2% of the world’s population.

DEVELOPMENTAL STAGE: Preclinical In-vitro. We are currently conducting animal studies to test the efficacy of our enzymes in bacterial and fungal models of infection.

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PATENT STATUS: PCT Application Filed

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