Research Project Proposal
Academic year 2018-2019

Project Nº 5

Title: *Antibiotic free injectable biomaterial coating to prevent implant-associated infections*

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Summary Infectious diseases are a major global threat for mankind in the 21st century, due to the rise of antibiotic resistant pathogens and the lack of new drugs/treatments. The situation is particularly problematic in implant-associated infections, because the implant surface gets colonized by a biofilm that protects bacterial cells from antimicrobials and the host immune system.

An ideal strategy to combat device associated infections would be the prevention of infection at the site of medical device. In recent years, much attention has been given to alternatives to antibiotics, such as antimicrobial peptides (AMPs), because bacteria rarely develop resistance against these agents. AMPs have broad-spectrum activity against multi-drug resistant microorganisms, ability to synergize with antibiotics and are rapidly bactericidal. Thus, AMPs are very well suited to fight against persistent biofilm infections. In this context, we will investigate the antimicrobial activity of AMPs characterized by a very low cytotoxicity and a potent antibiotic enhancing activity against multi-resistant bacteria. The anti-biofilm activity of the AMP alone and combined with antibiotics will be measured. Then, the peptide-antibiotic combinations displaying the highest anti-biofilm activity will be immobilized on solid matrices to develop surfaces with anti-biofilm properties. Modified surfaces will be characterized by electron microscopy and the anti-biofilm activity of surfaces will be assessed by viable counts and confocal microscopy. The mechanism of action of combinations will be studied at molecular level by RT-PCR and RT-qPCR

Methods: Determination of antibiotic susceptibility, quantification of synergy, evaluation of biofilm growth and inhibition, confocal and electron microscopy, RT-PCR and RT-qPCR

yes	**X**	**Does the project include the possibility of supervised animal manipulation to complete the training for animal manipulator?**
no		